



To the Honorable Council  
City of Norfolk, Virginia

May 12, 2015

From: David Ricks, P.E., Director of Public Works

**Subject:** Acceptance of 2015 Storm  
Water Local Assistance Fund Grant.

Reviewed:

Ronald H. Williams, Jr., Deputy City  
Manager

**Ward/Superward:** Citywide

Approved:

Marcus D. Jones, City Manager

**Item Number:**

**R-9**

I. **Recommendation:** Adopt Ordinance

II. **Applicant:** City of Norfolk, Department of Public Works

III. **Description**

This ordinance will authorize the acceptance and appropriation of the Storm Water Local Assistance Fund in support of local governments addressing more stringent water quality requirements including the Environmental Protection Agency (EPA) mandated Chesapeake Bay Total Maximum Daily Load.

IV. **Analysis**

This funding will be used to assist the City with meeting storm water regulatory requirements, meeting the Chesapeake Bay Total Maximum Daily Load, and improving local water quality.

V. **Financial Impact**

The grant will fund \$1,548,476 for implementation of these practices with a \$1,548,476 match from the Storm Water CIP. The grant will be administered utilizing current Storm Water Management staff.

VI. **Environmental**

There is no negative environmental impact. These projects have a positive impact on local water quality, as well as, assist the City with meeting the water quality regulatory mandates from the EPA and Virginia Department of Environmental Quality.

**VII. Community Outreach/Notification**

Public notification for this agenda item is not required.

**VIII. Board/Commission Action**

N/A

**IX. Coordination/Outreach**

This ordinance has been coordinated with the City Attorney's office.

Supporting Material from the Department of Public Works:

- Ordinance
- Attachment 1: Grant Award Letter
- Attachment 2: Signed Application

Form and Correctness Approved:

By

Office of the City Attorney

Contents Approved:

By

DEPT. Public Works

NORFOLK, VIRGINIA

Pursuant to Section 72 of the City Charter, I hereby certify that the money required for this item is in the city treasury to the credit of the fund from which it is drawn and not appropriated for any other purpose.

\$ 3,096,952.00 2275-35-8892

Wm. M. Kelly  
Director of Finance

Account  
4/16/15  
Date

## ORDINANCE No.

AN ORDINANCE ACCEPTING \$1,548,476 STORM WATER LOCAL ASSISTANCE FUND GRANT FOR THE IMPLEMENTATION OF FLOOD REDUCTION AND ENVIROMENTAL SUSTAINABILITY AND APPROPRIATING AND AUTHORIZING THE EXPENDITURE OF THE \$1,548,476 GRANT AND \$1,548,476 MATCH FUNDS FOR THE WATER QUALITY IMPROVEMENT PROJECTS.

- - -

WHEREAS, the City desires to accept grant funds of up to \$1,548,476 from the Virginia Department of Environmental Quality; and

WHEREAS, these funds will be used to fund the development, design and construction of the water quality improvement practices and projects; now, therefore,

BE IT ORDAINED by the Council of the City of Norfolk:

Section 1:- That the City hereby accepts the \$1,548,476 Storm Water Local Assistance Fund Grant.

Section 2:- That the \$1,548,476 in grant funds and \$1,548,476 match funding are hereby appropriated and authorized for expenditure for the water quality improvement practices and projects.

Section 3:- That the City manager and other proper officers of the City are authorized to do all things necessary to receive the grant funds and administer the projects.

Section 4:- That this ordinance shall be in effect from and after its adoption.



# Attachment 1



## COMMONWEALTH of VIRGINIA

### DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219

Mailing address: P.O. Box 1105, Richmond, Virginia 23218

[www.deq.virginia.gov](http://www.deq.virginia.gov)

Molly Joseph Ward  
Secretary of Natural Resources

David K. Paylor  
Director

(804) 698-4000  
1-800-592-5482

December 17, 2014

Mr. Justin Shafer  
City of Norfolk  
2233 McCann Avenue  
Norfolk, Virginia 23509

Re: Stormwater Local Assistance Fund (SLAF) FY 2015  
City of Norfolk

Dear Mr. Shafer:

I am pleased to inform you that I have authorized SLAF matching grant funds for your community for the project(s) and amounts shown below. This authorization is contingent upon compliance with all program requirements. Actual grant award will not occur until after your receipt of construction bids and DEQ's approval of a final project budget based on those bids. My staff will be in contact with you in the near future to set up a meeting to discuss the next steps and schedule for moving forward with your project(s).

• Lake Taylor Retention Pond Retrofit	\$843,500
• Roberts Road Retention Pond Retrofit	\$136,500
• Hague Retention Pond Construction	\$263,976
• Templar Boulevard Stream Restoration	\$71,000
• Bluebird Park Stormwater Wetland Construction	\$84,500
• Central Business Park Retention Pond Retrofit	\$82,000
• Dune Street Wet Swale Retrofit	\$67,000

Please do not hesitate to contact Walter Gills (804 698-4133) or Kelly Ward (804 698-4295) if you have any questions or need assistance.

Sincerely,

A handwritten signature in dark ink, appearing to read "David K. Paylor".

David K. Paylor

pc: Walter Gills - DEQ/CWFAP

## Lake Taylor Level II Wet Pond





DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
APPLICATION FOR STORMWATER LOCAL ASSISTANCE FUND (SLAF)  
STORMWATER CAPITAL PROJECTS

**SECTION A - ORGANIZATIONAL DATA**

Name of Applicant:	City of Norfolk		
Applicant Address:	2233 McKann Ave Norfolk, VA 23509		
Contact Person:	Justin Shafer		
Phone:	757-823-4048	Email:	justin.shafer@norfolk.gov
Name of Engineer:	Kimley-Horn and Associates, Inc		
Engineer Address:	4500 Main St Suite 500 Virginia Beach, VA 23455		
Contact Person:	Karl Mertig		
Phone:	757-355-6671	Email:	Karl.Mertig@kimley-horn.com

**SECTION B - PROPOSED FUNDING**

**PROJECT FUNDING**

a) Amount of SLAF Grant Funds Requested	843,500		
	<b>Source of Match Funds</b>	<b>Amount</b>	<b>CHECK BOX IF COMMITTED</b>
1	Storm Water CIP	843,500	✓
2			
3			
b) Total Other Funding Available (1 + 2 + 3 ...)**	843,500		
c) Total Project Cost (a + b)	1,687,000		

\*SLAF Grants provide up to 50% of project costs. Applicant must identify anticipated source(s) and amount(s) of match funds.

\*\*This amount must be at least equal to the amount of Grant Funds being requested

**SECTION C - WATER QUALITY DATA**

Location of Project	Latitude	36.8657	Longitude	-76.1977
(Latitude and Longitude of project is a required entry on this application. The points should be the nearest approximation of the center of your project. Please identify them in decimal degrees.)				
Name of Stream / Waterbody Impacted by stormwater runoff being addressed by the project				
Broad Creek, Eastern Branch Elizabeth River				
River Basin for Receiving Stream / Waterbody				
James River				

## SECTION D -BRIEF PROJECT DESCRIPTION AND STATEMENT OF NEED

Please include a description of project including: type of project (e.g. extended detention pond retrofit), size of area treated (acres), TMDL or impaired water the project addresses, if the project is relevant to a TMDL Implementation Plan, and other relevant information pertaining to the project. Describe the need for the proposed project. Needs should be in areas of restoring, protecting or preventing pollution in State waters.  
(attach additional pages if necessary)

Lake Taylor is a 37.7 acre impoundment draining a 1,094 acre watershed consisting of residential, mixed commercial, and institutional development in the cities of Norfolk and Virginia Beach. Originally created to serve as a water reservoir, the lake has ceased to serve as part of the reservoir system, but has continued to act as a basic retention basin. The proposed retrofit will enhance the lake to a DEQ Level 2 Wet Pond by dividing the lake into cells using earthen berms, establishing forebays at all major outfalls into the lake, adding aeration, and adding 3.8 acres of wetlands. Construction of the project will be broken into 3 phases over several years. An increase of 267.1 lbs/yr P removal will be gained.

The BMP drains to Broad Creek and then to the Eastern Branch of the Elizabeth River. The 2012 DEQ 303d list identifies these receiving waters as impairments for dissolved oxygen, PCB in fish tissue, Enterococcus, and estuarine bioassessment. The Chesapeake Bay TMDL addresses impairment of the entire watershed for phosphorous, nitrogen, and sediment. Proposed improvements to this BMP will provide improved pollutant removal efficiency, which will assist in meeting the Bay TMDL and local impairments.

Feasibility analysis of the BMP is complete, with design anticipated to proceed by the end of the current fiscal year, with construction of the first phase scheduled for FY16. Funds are requested to allow a more rapid construction schedule of this and other currently planned projects, and to free funding for further proposed water quality projects.

## SECTION E - POLLUTION REDUCTION

The calculated Total Pounds (Per Year) of Total Phosphorous reduced from stormwater as a result of this project

= 267.1 pounds per year

The established methodology for calculating the TP reduction is outlined in Attachment A of the SLAF Guidelines. To verify calculations for pollution reduction, the following information is required with the application:

- 1) Print out the Site Data tab of the Virginia Runoff Reduction Method Spreadsheet showing the data entered and resultant TP load. Supporting documentation with rationale for parameter selection must be provided to demonstrate that the parameter estimates are valid for the project.
- 2) Provide Text to indicate which pollution reduction calculation methodology was selected, why it is appropriate for the project, the calculated phosphorus load reduction, any assumptions with supporting documentation, and parameters selected with rationale for selection (must be provided to demonstrate that estimates are valid for the project). All supporting calculations must be provided.
- 3) If the project is a retrofit of an existing BMP provide photographs showing the BMP before the upgrade. Provide text to describe the upgrade / enhancement and the incremental phosphorus load reduction achieved utilizing the SLAF guideline references, with supporting documentation. Rationale and calculated estimates BMP's current (former) efficiency must be provided.



**SECTION F - READINESS-TO-PROCEED  
PROJECT STATUS**

	Yes	No	N/A
Is the project included in Stormwater or Watershed Management Plan? (If Yes, attach documentation to application)	✓		
Is the project identified in current year Capital Improvement Plan or Annual Budget? (If Yes, attach documentation to application)	✓		
Is acquisition of land necessary to complete project?		✓	
Has the land necessary for the project already been acquired? (If Yes, attach documentation to application)			✓
Has an engineer been selected for project design? (If Yes, provide name)	✓		

**ANTICIPATED SCHEDULE**

	<i>Schedule Item Description</i>	<i>Date</i>
a.	Notice to Proceed on Design	June 1, 2015
b.	Completion of Plans/Specifications	January 1, 2016
c.	Plans and Specs Approved	February 15, 2016
d.	Advertise for Bids	February 28, 2016
e.	Bid Opening	March 22, 2016
f.	Award Contracts	June 6, 2016
g.	Estimated Construction Time (expressed in months)	6

**SECTION G -PROJECT BUDGET INFORMATION**

Legal / Administration	\$0.00
Land, Right-of-Way	\$0.00
Architectural Engineering Basic Fees	298,000
Project Inspection Fees	\$0.00
Other (Explain)	\$0.00
Stormwater BMP Construction	1,250,100
Contingencies	138,900
<b>TOTAL*</b>	<b>1,687,000 *</b>

\*This amount should be the exact same as the amount in Item c) Total Project Cost, Section B, Page 1.

## SECTION H

	Yes	No	N/A
Has applicant adopted a dedicated source of revenue to implement a stormwater control program in accordance with §15.2-2114? (If so, attach documentation)	✓		
Is the applicant subject to an MS4 discharge permit in accordance with §62.1-44.5?	✓		
Does the project address requirements of your MS4 permit? If yes, explain:	✓		
The City of Norfolk MS4 permit calls for the City to develop, implement and refine pollution prevention measures, management or removal techniques, and other appropriate means to control the quality and quantity of storm water discharged from the MS4. The permit further calls for a program to utilize structural and source control measures to reduce pollutants from commercial and residential areas. The project described above will provide both quality and quantity improvements to water discharged through the City's MS4, meeting a requirement of the permit.			

Name of MS4 Permittee if different from Applicant

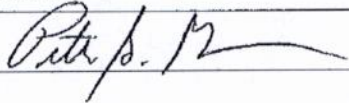
## SECTION I - ASSURANCES AND CERTIFICATIONS

The undersigned representative of the applicant certifies that the information contained herein and the attached statements and exhibits are true, correct and complete to the best of their knowledge and belief. The undersigned also agrees to clarify or supplement information pertaining to this application upon request.

Name: Pete Garner

Title: Operations Engineering Manager

Signature:



Date: October 21, 2014

## SECTION J - ATTACHMENTS

Include all required attachments appropriate for your application. The following is a list of potential attachments:

- 1) Documentation supporting the Pollution Reduction methodology, calculations, text, etc. as described in Section E.
- 2) Excerpt from Stormwater or Watershed Management Plan. (Section F)
- 3) Excerpt from Capital Improvement Plan or Annual Budget. (Section F)
- 4) Documentation of land acquisition. (Section F)
- 5) Documentation of Dedicated Revenue Source for Stormwater Management Program. (Section H)



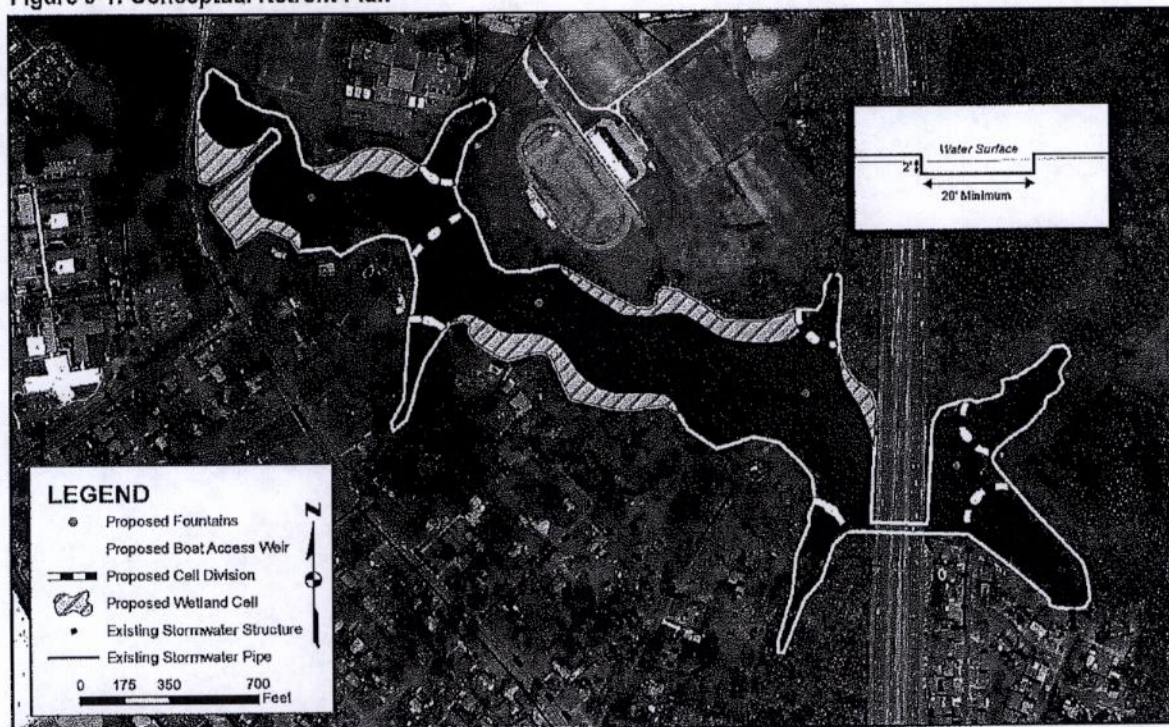
## EXECUTIVE SUMMARY

The City of Norfolk, Virginia requested that Kimley-Horn and Associates, Inc. (Kimley-Horn) conduct a feasibility study to evaluate water quality improvement opportunities and potential generation of nutrient credits for Lake Taylor (the Site) in Norfolk, Virginia. The primary goal of the proposed improvements will be to reduce nutrient loading in Broad Creek and thus, the Chesapeake Bay and provide an opportunity for the City to obtain nutrient reduction credits. Secondary benefits will include the improvement of natural habitat through the creation and enhancement of wetlands.

Lake Taylor is located south of the intersection of Interstate-64 and Route-13 in eastern Norfolk, Virginia. Lake Taylor is approximately 37.7 acres in size and is irregular in shape. Cross sections taken across the lake show that the average depth below normal water surface elevation is 2.5 feet. The lake outfalls at its western terminus, approximately 700 feet downstream of Kempsville Road, into the upstream limits of Broad Creek. Broad Creek is a tributary of the Eastern Branch of the Elizabeth River (HUC 020802080204) and the Chesapeake Bay. Lake Taylor currently functions as a retention pond with significantly less than 45% phosphorus removal efficiency.

After completing Site reconnaissance, document review, and hydrologic analysis Kimley-Horn determined that the most effective retrofit opportunity is enhancement of the pond to a DEQ Level 2 Wet Pond as depicted in Figure 3-1, Conceptual Retrofit Plan. Wet Ponds treat runoff and improve water quality by providing an enhanced environment for gravitational settling, biological uptake and microbial activity. The retrofit would consist primarily of dividing the lake into multiple cells including several pretreatment forebays, adding nearly 3.8 acres of wetlands, ensuring adequate outfall protection, and providing aeration.

Figure 3-1: Conceptual Retrofit Plan





Both the forebay and cell division will likely consist of earthen berms. Each berm will have a minimum 20 foot wide weir with a depth set 2.0 feet below normal water. This weir will allow for boat access and fish passage through the berms.

The water quality calculations for analysis of the proposed retrofit utilized the Virginia Runoff Reduction Method and are included as Appendix D. The proposed retrofit could potentially reduce annual phosphorus loading by up to 174.4 pounds in Phase One, 50.1 pounds in Phase Two, and 44.5 pounds in Phase Three. A preliminary Opinion of Probable Construction Cost (OPCC) was prepared for each phase of the retrofit of Lake Taylor. The OPCCs include major aspects of the retrofit design as described above, including dredging, cell division, wetland plantings, and erosion and sediment control. The total construction cost per this OPCC is approximately \$688,000 for Phase 1, \$343,000 for Phase 2, and \$358,000 for Phase 3. A copy of the OPCC for each phase is included as Appendix C. Table 4-2 summarizes the nutrient removal rates and cost efficiency of the proposed pond retrofit.

Table 4-2: Nutrient Removal Efficiency			
	Nutrient Removal	Cost Efficiency / Year	Cost / 20-Year Maintenance Cycle
Phase 1			
Phosphorus	174.4 lbs./yr.	\$3,900 /lbs./yr.	\$195 /lbs./yr.
Nitrogen	625.1 lbs./yr.	\$1,100 /lbs./yr.	\$55 /lbs./yr.
Total Suspended Solids	37,440 lbs./yr.	\$18 /lbs./yr.	\$0.90 /lbs./yr.
Phase 2			
Phosphorus	50.1 lbs./yr.	\$6,800 /lbs./yr.	\$340 /lbs./yr.
Nitrogen	179.6 lbs./yr.	\$1,900 /lbs./yr.	\$95 /lbs./yr.
Total Suspended Solids	12,028 lbs./yr.	\$29 /lbs./yr.	\$1.45 /lbs./yr.
Phase 3			
Phosphorus	44.5 lbs./yr.	\$8,000 /lbs./yr.	\$400 /lbs./yr.
Nitrogen	132.4 lbs./yr.	\$2,700 /lbs./yr.	\$135 /lbs./yr.
Total Suspended Solids	8,942 lbs./yr.	\$40 /lbs./yr.	\$2.00/lbs./yr.
Overall			
Phosphorus	269.0 lbs./yr.	\$5,200/lbs./yr.	\$260/lbs./yr.
Nitrogen	937.1 lbs./yr.	\$1,500/lbs./yr.	\$75/lbs./yr.
Total Suspended Solids	58,411 lbs./yr.	\$24/lbs./yr.	\$1.20/lbs./yr.

Kimley-Horn recommends that coordination with the USACE and DEQ be continued to complete confirmation of coverage under a USACE Nationwide Permit 27 and/or 43. Kimley-Horn recommends a full geotechnical investigation to determine the composition of the in-situ soils and their suitability for re-use for cell division and wetland cell creation. Kimley-Horn also recommends coordination with DEQ and the City of Virginia Beach to determine nutrient removal credit allocation for the portion of the treated drainage area located in Virginia Beach.

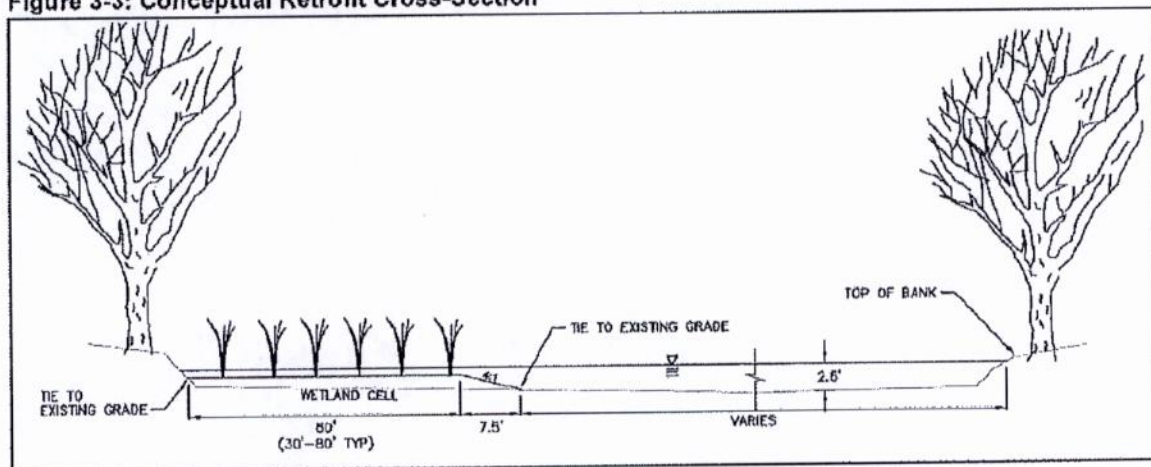
In total, the proposed retrofit could potentially reduce annual phosphorus loading by up to 269.0 pounds and could reduce annual nitrogen loading by up to 937.1 pounds. It is also estimated that 58,411 pounds of total suspended solids/sediments could be reduced per year with proper maintenance of the pond. This retrofit will assist the City in meeting its target TMDL goals as well as provide improvement of natural habitat through the creation of wetlands and conservation area.



Figure 2-2: Watershed Delineation Map



Figure 3-3: Conceptual Retrofit Cross-Section



# Kimley»Horn

Project: Lake Taylor - Phase I  
 Project #: 113057069  
 Date: 10/21/2014  
 Locality: Norfolk (City)

LAND USE TYPE	C	CN
IMPERVIOUS	0.95	98
MANAGED TURF	0.25	80
FOREST/ OPEN SPACE	0.05	77

Drainage Area Summary - Phase I						
Site Name	Drainage Area	Impervious	Managed Turf	Forest/Open Space	C	CN
Norfolk Drainage Area	556.68 ac	218.74 ac	151.79 ac	186.15 ac	0.46	86.1
Virginia Beach Drainage Area	357.80 ac	106.12 ac	130.44 ac	121.24 ac	0.39	84.3
Total Drainage Area	914.48 ac	324.86 ac	282.23 ac	307.39 ac	0.43	85.4

Pond Retrofit Nutrient Removal			
Site Name	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pre-Retrofit	403.7 lbs/yr	1284.2 lbs/yr	74,881 lbs/yr
Post-Retrofit	578.1 lbs/yr	1909.3 lbs/yr	112,321 lbs/yr
Net Benefit	174.4 lbs/yr	625.1 lbs/yr	37,440 lbs/yr

Proposed Water Quality Volume					
	Elevation (feet)	Area (feet)	Inc. Vol.	Total Volume	Total Volume
Normal Water	2.5	858,755	0 cf	0 cu-ft	0 ac-ft
	2.0	826,326	421,270 cf	421,270 cu-ft	9.67 ac-ft
	1.0	794,152	810,239 cf	1,231,509 cu-ft	28.27 ac-ft
	0.0	784,664	789,408 cf	2,020,917 cu-ft	46.39 ac-ft
	-1.0	180,526	482,595 cf	2,503,512 cu-ft	57.47 ac-ft
	-2.0	166,517	173,522 cf	2,677,034 cu-ft	61.46 ac-ft
	-2.5	152,846	79,841 cf	2,756,875 cu-ft	63.29 ac-ft



# Kimley»Horn

Project: Lake Taylor - Phase II  
 Project #: 113057069  
 Date: 10/21/2014  
 Locality: Norfolk (City)

LAND USE TYPE	C	CN
IMPERVIOUS	0.95	98
MANAGED TURF	0.25	80
FOREST/ OPEN SPACE	0.05	77

Drainage Area Summary - Phase II						
Site Name	Drainage Area	Impervious	Managed Turf	Forest/Open Space	C	CN
Total Drainage Area	189.07 ac	97.55 ac	63.33 ac	28.20 ac	0.58	88.8

Pond Retrofit Nutrient Removal			
Site Name	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pre-Retrofit	116.3 lbs/yr	370.4 lbs/yr	24,057 lbs/yr
Post-Retrofit	166.4 lbs/yr	550.0 lbs/yr	36,085 lbs/yr
Net Benefit	50.1 lbs/yr	179.6 lbs/yr	12,028 lbs/yr

Proposed Water Quality Volume					
	Elevation (feet)	Area (feet)	Inc. Vol.	Total Volume	Total Volume
Normal Water	2.5	493,435	0 cf	0 cu-ft	0 ac-ft
	2.0	478,896	243,083 cf	243,083 cu-ft	5.58 ac-ft
	1.0	464,498	471,697 cf	714,780 cu-ft	16.41 ac-ft
	0.0	458,749	461,624 cf	1,176,403 cu-ft	27.01 ac-ft
	-1.0	59,304	259,027 cf	1,435,430 cu-ft	32.95 ac-ft
	-2.0	52,085	55,695 cf	1,491,124 cu-ft	34.23 ac-ft
	-2.5	45,108	24,298 cf	1,515,423 cu-ft	34.79 ac-ft

# Kimley»Horn

Project: Lake Taylor - Phase III  
 Project #: 113057069  
 Date: 10/21/2014  
 Locality: Norfolk (City)

LAND USE TYPE	C	CN
IMPERVIOUS	0.95	98
MANAGED TURF	0.25	80
FOREST/ OPEN SPACE	0.05	77

Drainage Area Summary - Phase III						
Site Name	Drainage Area	Impervious	Managed Turf	Forest/Open Space	C	CN
Total Drainage Area	49.17 ac	26.46 ac	16.97 ac	5.74 ac	0.60	89.3

Pond Retrofit Nutrient Removal			
Site Name	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pre-Retrofit	101.2 lbs/yr	306.2 lbs/yr	17,885 lbs/yr
Post-Retrofit	145.7 lbs/yr	438.5 lbs/yr	26,827 lbs/yr
Net Benefit	44.5 lbs/yr	132.4 lbs/yr	8,942 lbs/yr

Existing Water Quality Volume					
	Elevation (feet)	Area (feet)	Inc. Vol.	Total Volume	Total Volume
Normal Water	2.5	344,201	0 cf	0 cu-ft	0 ac-ft
	2.0	329,955	168,539 cf	168,539 cu-ft	3.87 ac-ft
	1.0	315,714	322,835 cf	491,374 cu-ft	11.28 ac-ft
	0.0	310,963	313,339 cf	804,712 cu-ft	18.47 ac-ft
	-1.0	22,755	166,859 cf	971,571 cu-ft	22.30 ac-ft
	-2.0	20,380	21,568 cf	993,139 cu-ft	22.80 ac-ft
	-2.5	18,137	9,629 cf	1,002,768 cu-ft	23.02 ac-ft



Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014									
To be used w/ DRAFT 2013 BMP Standards and Specifications									
Site Data									
Project Name: Lake Taylor - Phase I									
Date: October 2014									
<div> <div>data input cells</div> <div>calculation cells</div> <div>constant values</div> </div>									
Post-ReDevelopment Project & Land Cover Information					Total Disturbed Acreage		15.00		
Constants									
Annual Rainfall (inches)	46								
Target Rainfall Event (inches)	1.00								
Phosphorus EMC (mg/L)	0.28			Nitrogen EMC (mg/L)			1.86		
Target Phosphorus Target Load (lb/acre/yr)	8.41								
P	0.80								
Pre-ReDevelopment Land Cover (acres)									
	A Soils	B Soils	C Soils	D Soils	Totals				
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	50.46	136.95	110.58	307.40				
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	92.26	132.71	67.26	282.23				
Impervious Cover (acres)	0.00	0.00	0.00	324.85	324.85				
	Total				914.48				
Post-ReDevelopment Land Cover (acres)									
	A Soils	B Soils	C Soils	D Soils	Totals				
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	50.46	136.95	114.34	310.75				
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	92.26	132.71	67.26	282.23				
Impervious Cover (acres)	0.00	0.00	0.00	321.60	321.60				
	Total				914.48				
Area Check									
	Okay		Okay		Okay		Okay		
Rv Coefficients									
	A Soils	B Soils	C Soils	D Soils					
Forest/Open Space	0.02	0.03	0.04	0.06					
Managed Turf	0.15	0.20	0.22	0.25					
Impervious Cover	0.95	0.95	0.95	0.95					
Land Cover Summary									
Pre-ReDevelopment	Listed	Adjusted <sup>1</sup>	Land Cover Summary		Post-ReDevelopment		Land Cover Summary		
Forest/Open Space Cover (acres)	307.40	307.40	Forest/Open Space Cover (acres)		310.75		Post-ReDevelopment New Impervious		
Composite Rv(forest)	0.04	0.04	Composite Rv(forest)		0.04				
% Forest	34%	34%	% Forest		34%				
Managed Turf Cover (acres)	282.23	282.23	Managed Turf Cover (acres)		282.23				
Composite Rv(turf)	0.22	0.22	Composite Rv(turf)		0.22				
% Managed Turf	31%	31%	% Managed Turf		31%				
Impervious Cover (acres)	324.85	324.85	ReDev. Impervious Cover (acres)		321.60		New Impervious Cover (acres)		
Rv(impervious)	0.95	0.95	Rv(impervious)		0.95		0.95		
% Impervious	36%	36%	% Impervious		35%		% Impervious Check Area		
Total Site Area (acres)	914.48	914.48	Total ReDev. Site Area (acres)		914.48		Total New Dev. Site Area (acres)		
Site Rv	0.42	0.42	ReDev. Site Rv		0.42		New Dev. Site Rv		
Pre-Development Treatment Volume (acre-ft)									
	31.9488	31.9488	Post-ReDevelopment Treatment Volume (acre-ft)		31.9373		Post-Development Treatment Volume (acre-ft)		
Pre-Development Treatment Volume (cubic feet)									
	1,391,680	1,391,680	Post-ReDevelopment Treatment Volume (cubic feet)		1,380,736		Post-Development Treatment Volume (cubic feet)		
Pre-Development Load (TP) (lb/yr)									
	928.89	928.89	Post-ReDevelopment Load (TP) (lb/yr)		921.58		Post-Development Load (TP) (lb/yr)		
<sup>1</sup> Adjusted Land Cover Summary reflects the pre redevelopment land cover minus the previous land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requirement for the new impervious cover to meet the new development load limit is computed in Column L.									
				Maximum % Reduction Required Below Pre-ReDevelopment Load		20%			
				TP Load Reduction Required for Redeveloped Area (lb/yr)		178.47		TP Load Reduction Required for New Impervious Area (lb/yr)	
				Total Load Reduction Required (lb/yr)		178.47			
Pre-Development Load (TN) (lb/yr)									
	8645.11		Post-Development Load (TN) (lb/yr)		8592.85				

Site Results						
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	324.85	0.00	0.00	0.00	0.00	AREA EXCEEDED!
IMPERVIOUS COVER TREATED	324.85	0.00	0.00	0.00	0.00	AREA EXCEEDED!
TURF AREA	282.23	1.00	0.00	0.00	0.00	AREA EXCEEDED!
TURF AREA TREATED	282.23	1.00	0.00	0.00	0.00	AREA EXCEEDED!
AREA CHECK	OK.	OK.	OK.	OK.	OK.	
Phosphorous						
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	178.47					
RUNOFF REDUCTION (cf)	73					
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	403.69					
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	517.89					
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 225.2 LB/YEAR!!					
Nitrogen (for information purposes)						
RUNOFF REDUCTION (cf)	73					
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	1284.22					
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	5308.63					



Lake Taylor Phase 1 Post

Site Results						
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	321.50	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	321.50	0.00	0.00	0.00	0.00	OK.
TURF AREA	282.23	1.00	0.00	0.00	0.00	AREA EXCEEDED!
TURF AREA TREATED	282.23	1.00	0.00	0.00	0.00	AREA EXCEEDED!
AREA CHECK	OK.	OK.	OK.	OK.	OK.	
Phosphorous						
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	178.47					
RUNOFF REDUCTION (cf)	73					
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	578.05					
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	343.53					
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 399.6 LB/YEAR!!					
Nitrogen (for information purposes)						
RUNOFF REDUCTION (cf)	73					
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	1909.27					
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	4683.58					

## Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014

To be used w/ DRAFT 2013 BMP Standards and Specifications

Site Data

Project Name: Lake Taylor - Phase 2

Date: October 2014

	data input cells	calculation cells	constant values				
<b>Post-ReDevelopment Project &amp; Land Cover Information</b>				<b>Total Disturbed Acreage</b>	10.00		
<b>Constants</b>							
Annual Rainfall (inches)	46						
Target Rainfall Event (inches)	1.00						
Phosphorus EMC (mg/L)	0.26			Nitrogen EMC (mg/L)	1.86		
Target Phosphorus Target Load (lb/acre/yr)	0.41						
P	0.90						
<b>Pre-ReDevelopment Land Cover (acres)</b>							
	<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	<b>Totals</b>		
Forest/Open Space (acres) - undisturbed, protected forest/open space or reforested land	0.00	0.00	16.22	3.30	29.24		
Managed Turf (acres) - disturbed, graded for yards or other turf to be mowed/managed	0.00	10.82	42.88	9.63	63.33		
Impervious Cover (acres)	0.00	0.00	0.00	97.55	97.55		
				<b>Total</b>	<b>189.07</b>		
<b>Post-ReDevelopment Land Cover (acres)</b>							
	<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>	<b>Totals</b>		
Forest/Open Space (acres) - undisturbed, protected forest/open space or reforested land	0.00	0.00	16.22	4.34	29.24		
Managed Turf (acres) - disturbed, graded for yards or other turf to be mowed/managed	0.00	10.82	42.88	9.63	63.33		
Impervious Cover (acres)	0.00	0.00	0.00	96.51	96.51		
				<b>Total</b>	<b>189.07</b>		
Area Check	Okay	Okay	Okay	Okay			
<b>Rv Coefficients</b>							
	<b>A soils</b>	<b>B Soils</b>	<b>C Soils</b>	<b>D Soils</b>			
Forest/Open Space	0.02	0.03	0.04	0.05			
Managed Turf	0.15	0.20	0.22	0.25			
Impervious Cover	0.95	0.95	0.95	0.95			
<b>Land Cover Summary</b>							
<b>Pre-ReDevelopment</b>	<b>Listed</b>	<b>Adjusted<sup>1</sup></b>	<b>Land Cover Summary Post-ReDevelopment</b>		<b>Land Cover Summary Post-ReDevelopment New Impervious</b>		
Forest/Open Space Cover (acres)	29.24	29.24	Forest/Open Space Cover (acres)	29.24			
Composite Rv(forest)	0.04	0.04	Composite Rv(forest)	0.04			
% Forest	15%	15%	% Forest	15%			
Managed Turf Cover (acres)	63.33	63.33	Managed Turf Cover (acres)	63.33			
Composite Rv(turf)	0.22	0.22	Composite Rv(turf)	0.22			
% Managed Turf	33%	33%	% Managed Turf	33%			
Impervious Cover (acres)	97.55	97.55	ReDev. Impervious Cover (acres)	96.51	New Impervious Cover (acres)	0.00	
Rv(impervious)	0.95	0.95	Rv(impervious)	0.95	Rv(impervious)	0.95	
% Impervious	52%	52%	% Impervious	51%	% Impervious	Check Area	
Total Site Area (acres)	189.07	189.07	Total ReDev. Site Area (acres)	189.07	Total New Dev. Site Area (acres)	0.00	
Site Rv	0.57	0.57	ReDev. Site Rv	0.57	New Dev. Site Rv	0.95	
Pre-Development Treatment Volume (acre-ft)	8.9606	8.9606	Post-ReDevelopment Treatment Volume (acre-ft)	8.9025	Post-Development Treatment Volume (acre-ft)	0.0000	
Pre-Development Treatment Volume (cubic feet)	391,193	391,193	Post-ReDevelopment Treatment Volume (cubic feet)	387,795	Post-Development Treatment Volume (cubic feet)	0	
Pre-Development Load (TP) (lb/yr)	281.10	281.10	Post-ReDevelopment Load (TP) (lb/yr)	258.84	Post-Development Load (TP) (lb/yr)	0.00	
<sup>1</sup> Adjusted Land Cover Summary reflects the pre redevelopment land cover minus the previous land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requirement for the new impervious cover to meet the new development load limit is computed in Column L.							
Maximum % Reduction Required Below Pre-ReDevelopment Load				20%			
TP Load Reduction Required for Redeveloped Area (lb/yr)				49.95	TP Load Reduction Required for New Impervious Area (lb/yr)	0.00	
Total Load Reduction Required (lb/yr)				49.95			
Pre-Development Load (TN) (lb/yr)	1867.00		Post-Development Load (TN) (lb/yr)	1861.88			



Lake Taylor - Phase 2 Pre

Site Results						
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	97.55	0.00	0.00	0.00	0.00	AREA EXCEEDED!
IMPERVIOUS COVER TREATED	97.55	0.00	0.00	0.00	0.00	AREA EXCEEDED!
TURF AREA	63.33	1.00	0.00	0.00	0.00	AREA EXCEEDED!
TURF AREA TREATED	63.33	1.00	0.00	0.00	0.00	AREA EXCEEDED!
AREA CHECK	OK.	OK.	OK.	OK.	OK.	
Phosphorous						
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	49.95					
RUNOFF REDUCTION (cf)	73					
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	116.29					
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	142.56					
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 66.3 LB/YEAR!!					
Nitrogen (for information purposes)						
RUNOFF REDUCTION (cf)	73					
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	370.44					
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	1481.24					

Lake Taylor - Phase 2 Post

Site Results						
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	96.51	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	96.51	0.00	0.00	0.00	0.00	OK.
TURF AREA	63.33	1.00	0.00	0.00	0.00	AREA EXCEEDED!
TURF AREA TREATED	63.33	1.00	0.00	0.00	0.00	AREA EXCEEDED!
AREA CHECK	OK.	OK.	OK.	OK.	OK.	
Phosphorous						
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	49.95					
RUNOFF REDUCTION (cf)	73					
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	166.36					
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	92.47					
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 116.4 LB/YEAR!!					
Nitrogen (for information purposes)						
RUNOFF REDUCTION (cf)	73					
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	549.99					
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	1301.68					



Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014

To be used w/ DRAFT 2013 BMP Standards and Specifications

Site Data

Project Name: Lake Taylor - Phase 3

Date: October 2014

data input cells		calculation cells		constant values	
<b>Post-ReDevelopment Project &amp; Land Cover Information</b>					
Total Disturbed Acreage					10.00
<b>Constants</b>					
Annual Rainfall (inches)	46	Nitrogen EMC (mg/L)		1.86	
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26				
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.99				
<b>Pre-ReDevelopment Land Cover (acres)</b>					
	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) - undisturbed, protected forest/open space or reforested land	0.00	0.73	1.09	3.92	5.74
Managed Turf (acres) - disturbed, graded for yards or other turf to be moved/managed	0.00	3.52	2.10	11.35	16.97
Impervious Cover (acres)	0.00	0.00	0.00	26.48	26.48
	Total				49.18
<b>Post-ReDevelopment Land Cover (acres)</b>					
	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) - undisturbed, protected forest/open space or reforested land	0.00	0.73	1.09	5.20	7.02
Managed Turf (acres) - disturbed, graded for yards or other turf to be moved/managed	0.00	3.52	2.10	11.35	16.97
Impervious Cover (acres)	0.00	0.00	0.00	25.19	25.19
	Total				49.18
<b>Area Check</b>					
	Okay	Okay	Okay	Okay	
<b>Rv Coefficients</b>					
	A soils	B Soils	C Soils	D Soils	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	
<b>Land Cover Summary</b>					
Listed		Adjusted <sup>1</sup>		Land Cover Summary	
Pre-ReDevelopment		Post-ReDevelopment		Land Cover Summary	
Forest/Open Space Cover (acres)		Forest/Open Space Cover (acres)		Post-ReDevelopment New Impervious	
5.74		7.02			
Composite Rv(forest)		Composite Rv(forest)			
0.05		0.05			
% Forest		% Forest			
12%		12%			
Managed Turf Cover (acres)		Managed Turf Cover (acres)			
16.97		16.97			
Composite Rv(turf)		Composite Rv(turf)			
0.24		0.24			
% Managed Turf		% Managed Turf			
35%		35%			
Impervious Cover (acres)		Impervious Cover (acres)		New Impervious Cover (acres)	
26.48		25.19		0.00	
Rv(impervious)		Rv(impervious)		Rv(impervious)	
0.95		0.95		0.95	
% Impervious		% Impervious		% Impervious Check Area	
54%		51%			
Total Site Area (acres)		Total ReDev. Site Area (acres)		Total New Dev. Site Area (acres)	
49.18		49.18		0.00	
Site Rv		ReDev. Site Rv		New Dev. Site Rv	
0.60		0.57		0.95	
Pre-Development Treatment Volume (acre-ft)		Post-Development Treatment Volume (acre-ft)		Post-Development Treatment Volume (acre-ft)	
2.4504		2.3547		0.0000	
Pre-Development Treatment Volume (cubic feet)		Post-Development Treatment Volume (cubic feet)		Post-Development Treatment Volume (cubic feet)	
106,739		102,571		0	
Pre-Development Load (TP) (lb/yr)		Post-Development Load (TP) (lb/yr)		Post-Development Load (TP) (lb/yr)	
71.24		68.46		0.00	
<sup>1</sup> Adjusted Land Cover Summary reflects the pre redevelopment land cover minus the previous land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requirement for the new impervious cover to meet the new development load limit is computed in Column I.					
		Maximum % Reduction Required Below Pre-ReDevelopment Load		20%	
		TP Load Reduction Required for Redeveloped Area (lb/yr)		TP Load Reduction Required for New Impervious Area (lb/yr)	
		11.47		0.00	
		Total Load Reduction Required (lb/yr)		11.47	
Pre-Development Load (TN) (lb/yr)		Post-Development Load (TN) (lb/yr)		489.78	
508.97		489.78			

Lake Taylor - Phase 3 Pre

Site Results							
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK	
IMPERVIOUS COVER	26.46	0.00	0.00	0.00	0.00	AREA EXCEEDED!	
IMPERVIOUS COVER TREATED	26.46	0.00	0.00	0.00	0.00	AREA EXCEEDED!	
TURF AREA	18.97	1.00	0.00	0.00	0.00	AREA EXCEEDED!	
TURF AREA TREATED	18.97	1.00	0.00	0.00	0.00	AREA EXCEEDED!	
AREA CHECK	OK.	OK.	OK.	OK.	OK.		
Phosphorous							
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	11.47						
RUNOFF REDUCTION (cf)	73						
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	31.85						
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	36.51						
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 20.4 LB/YEAR!!						
Nitrogen (for information purposes)							
RUNOFF REDUCTION (cf)	73						
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	102.06						
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	387.74						



Lake Taylor - Phase 3 Post

Site Results						
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
IMPERVIOUS COVER	25.19	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED	25.19	0.00	0.00	0.00	0.00	OK.
TURF AREA	18.97	1.00	0.00	0.00	0.00	AREA EXCEEDED!
TURF AREA TREATED	18.97	1.00	0.00	0.00	0.00	AREA EXCEEDED!
AREA CHECK	OK.	OK.	OK.	OK.	OK.	
Phosphorous						
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	11.47					
RUNOFF REDUCTION (cf)	73					
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	44.05					
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	24.41					
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 32.6 LB/YEAR!!					
Nitrogen (for information purposes)						
RUNOFF REDUCTION (cf)	73					
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	146.22					
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	343.55					

## Robert Rd Level II Wet Pond





**Attachment 2: Robert Rd Level II Wet Pond**



DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
APPLICATION FOR STORMWATER LOCAL ASSISTANCE FUND (SLAF)  
STORMWATER CAPITAL PROJECTS

**SECTION A - ORGANIZATIONAL DATA**

Name of Applicant: City of Norfolk

Applicant Address: 2233 McKann Ave  
Norfolk, VA 23509

Contact Person: Justin Shafer

Phone: 757-823-4048 Email: justin.shafer@norfolk.gov

Name of Engineer: Kimley-Horn and Associates, Inc

Engineer Address: 4500 Main St  
Suite 500  
Virginia Beach, VA 23455

Contact Person: Karl Mertig

Phone: 757-355-6671 Email: Karl.Mertig@kimley-horn.com

**SECTION B - PROPOSED FUNDING**  
**PROJECT FUNDING**

a) Amount of SLAF Grant Funds Requested 136,500

	Source of Match Funds	Amount	CHECK BOX IF COMMITTED
1	Storm Water CIP	136,500	✓
2			
3			

b) Total Other Funding-Available (1 + 2 + 3 ...)\*\* 136,500

c) Total Project Cost (a + b) 273,000

\*SLAF Grants provide up to 50% of project costs. Applicant must identify anticipated source(s) and amount(s) of match funds.

\*\*This amount must be at least equal to the amount of Grant Funds being requested

**SECTION C - WATER QUALITY DATA**

Location of Project Latitude 36.8587 Longitude -76.2581

(Latitude and Longitude of project is a required entry on this application. The points should be the nearest approximation of the center of your project. Please identify them in decimal degrees.)

Name of Stream / Waterbody impacted by stormwater runoff being addressed by the project  
Lafayette River, Elizabeth River

River Basin for Receiving Stream / Waterbody  
James River



## SECTION D -BRIEF PROJECT DESCRIPTION AND STATEMENT OF NEED

Please include a description of project including: type of project (e.g. extended detention pond retrofit), size of area treated (acres), TMDL or impaired water the project addresses, if the project is relevant to a TMDL Implementation Plan, and other relevant information pertaining to the project. Describe the need for the proposed project. Needs should be in areas of restoring, protecting or preventing pollution in State waters.  
(attach additional pages if necessary)

Roberts Rd Pond is a 4.3 acre retention basin draining a 48.15 acre watershed consisting of residential, mixed commercial, industrial and institutional development. The existing BMP removes 71.3 lb/yr P. The proposed retrofit will enhance the basin to a DEQ Level 2 Wet Pond by dividing it into cells using earthen berms, establishing forebays at all major outfalls, improving aeration, and adding 0.35 acres of wetlands. An increase of 31.7 lbs/yr P removal will be gained.

The BMP drains to the Lafayette River and then to the main channel of the Elizabeth River. The 2012 DEQ 303d list identifies these receiving waters as impaired for dissolved oxygen, PCB in fish tissue, Enterococcus, and estuarine bioassessment. The Chesapeake Bay TMDL addresses impairment of the entire watershed for phosphorous, nitrogen, and sediment. Proposed improvements to this BMP will provide improved pollutant removal efficiency, which will assist in meeting the Bay TMDL and local impairments.

Feasibility analysis of the BMP is complete, with design anticipated to proceed by the end of the current fiscal year, with construction scheduled for FY17. Funds are requested to allow a more rapid construction schedule of this and other currently planned projects, and to free funding for further proposed water quality projects.

## SECTION E - POLLUTION REDUCTION

The calculated Total Pounds (Per Year) of Total Phosphorous reduced from stormwater as a result of this project

=  pounds per year

The established methodology for calculating the TP reduction is outlined in Attachment A of the SLAF Guidelines. To verify calculations for pollution reduction, the following information is required with the application:

1) Print out the Site Data tab of the Virginia Runoff Reduction Method Spreadsheet showing the data entered and resultant TP load. Supporting documentation with rationale for parameter selection must be provided to demonstrate that the parameter estimates are valid for the project.

2) Provide Text to indicate which pollution reduction calculation methodology was selected, why it is appropriate for the project, the calculated phosphorus load reduction, any assumptions with supporting documentation, and parameters selected with rationale for selection (must be provided to demonstrate that estimates are valid for the project). All supporting calculations must be provided.

3) If the project is a retrofit of an existing BMP provide photographs showing the BMP before the upgrade. Provide text to describe the upgrade / enhancement and the incremental phosphorus load reduction achieved utilizing the SLAF guideline references, with supporting documentation. Rationale and calculated estimates BMP's current (former) efficiency must be provided.

**SECTION F - READINESS-TO-PROCEED  
PROJECT STATUS**

	Yes	No	N/A
Is the project included in Stormwater or Watershed Management Plan? (If Yes, attach documentation to application)	✓		
Is the project identified in current year Capital Improvement Plan or Annual Budget? (If Yes, attach documentation to application)	✓		
Is acquisition of land necessary to complete project?		✓	
Has the land necessary for the project already been acquired? (If Yes, attach documentation to application)			✓
Has an engineer been selected for project design? (If Yes, provide name)	✓		

**ANTICIPATED SCHEDULE**

	<i>Schedule Item Description</i>	<i>Date</i>
a.	Notice to Proceed on Design	June 1, 2015
b.	Completion of Plans/Specifications	February 1, 2016
c.	Plans and Specs Approved	March 14, 2016
d.	Advertise for Bids	March 27, 2016
e.	Bid Opening	April 19, 2016
f.	Award Contracts	July 19, 2016
g.	Estimated Construction Time (expressed in months)	6

**SECTION G -PROJECT BUDGET INFORMATION**

Legal / Administration	\$0.00
Land, Right-of-Way	\$0.00
Architectural Engineering Basic Fees	\$64000.00
Project Inspection Fees	\$0.00
Other (Explain)	\$0.00
Stormwater BMP Construction	188,100
Contingencies	\$20900.00
<b>TOTAL*</b>	<b>273,000 *</b>

\*This amount should be the exact same as the amount in Item c) Total Project Cost, Section B, Page 1.



## SECTION H

	Yes	No	N/A
Has applicant adopted a dedicated source of revenue to implement a stormwater control program in accordance with §15.2-2114? (If so, attach documentation)	✓		
Is the applicant subject to an MS4 discharge permit in accordance with §62.1-44.5?	✓		
Does the project address requirements of your MS4 permit? If yes, explain:	✓		
<p>The City of Norfolk MS4 permit calls for the City to develop, implement and refine pollution prevention measures, management or removal techniques, and other appropriate means to control the quality and quantity of storm water discharged from the MS4. The permit further calls for a program to utilize structural and source control measures to reduce pollutants from commercial and residential areas. The project described above will provide both quality and quantity improvements to water discharged through the City's MS4, meeting a requirement of the permit.</p>			

Name of MS4 Permittee if different from Applicant

## SECTION I - ASSURANCES AND CERTIFICATIONS

The undersigned representative of the applicant certifies that the information contained herein and the attached statements and exhibits are true, correct and complete to the best of their knowledge and belief. The undersigned also agrees to clarify or supplement information pertaining to this application upon request.

Name: Pete Garner

Title: Operations Engineering Manager

Signature:

Date: October 21, 2014

## SECTION J - ATTACHMENTS

Include all required attachments appropriate for your application. The following is a list of potential attachments:

- 1) Documentation supporting the Pollution Reduction methodology, calculations, text, etc. as described in Section E.
- 2) Excerpt from Stormwater or Watershed Management Plan. (Section F)
- 3) Excerpt from Capital Improvement Plan or Annual Budget. (Section F)
- 4) Documentation of land acquisition. (Section F)
- 5) Documentation of Dedicated Revenue Source for Stormwater Management Program. (Section H)



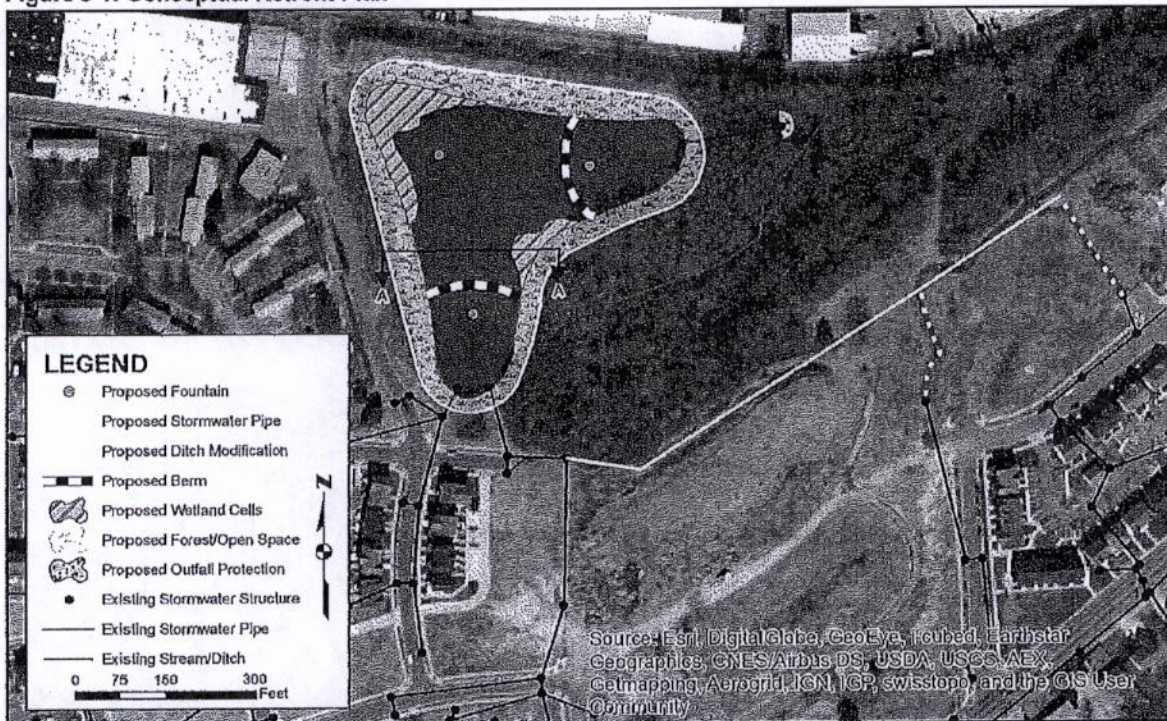
## EXECUTIVE SUMMARY

The City of Norfolk, Virginia requested that Kimley-Horn and Associates, Inc. (Kimley-Horn) conduct a feasibility study to evaluate water quality improvement opportunities and potential generation of nutrient credits for the Roberts Road Pond (the Site) in Norfolk, Virginia. The primary goal of the proposed improvements will be to reduce nutrient loading in the Lafayette River and thus, the Chesapeake Bay and provide an opportunity for the City to obtain nutrient reduction credits. Secondary benefits will include the improvement of natural habitat through the creation and enhancement of wetlands.

The Roberts Road Pond is located southeast of the intersection of Roberts Road and the Saint Julian Avenue in Norfolk, Virginia. The Pond is approximately 4.3 acres in size and triangular in shape. The Roberts Road Pond watershed is moderately developed with a mixture of medium and high density residential as well as minor industrial development. The pond outfalls into the upstream limits of the Lafayette River, a tributary of the Elizabeth River (HUC 020802080206) and the Chesapeake Bay. The Roberts Road Pond was designed in the 2003 Broad Creek Renaissance Project Master Plan as a Retention Basin I, as defined in the Virginia Stormwater Management Handbook, 1999.

After completing Site reconnaissance, document review, and hydrologic analysis Kimley-Horn determined that the most effective retrofit opportunity is enhancement of the pond to a DEQ Level 2 Wet Pond as depicted in Figure 3-1, Conceptual Retrofit Plan. Wet Ponds treat runoff and improve water quality by providing an enhanced environment for gravitational settling, biological uptake and microbial activity. The retrofit would consist primarily of dividing the pond into multiple cells including a pretreatment forebay, the addition of 0.35 acres of wetlands, ensuring adequate outfall protection, pond aeration, and conversion of the pond perimeter from managed turf to forest/open space.

Figure 3-1: Conceptual Retrofit Plan





To obtain nutrient removal for the runoff from sub-watershed 3 (Figure 2-1, Site Sub-Watershed Delineation Map, page 7), this area will need to be connected to Roberts Road pond. Two alternatives have been analyzed for completing this connection. Alternative One assumes the owner (NRHA) constructs the connection to sub-watershed 3 as required by the Broad Creek Renaissance Master Plan. This alternative accounts for the nutrient reduction provided by improving Roberts Road pond from a Level 1 to a Level 2 Wet Pond. Alternative Two assumes the City constructs the connection to sub-watershed 3 as a part of the retrofit improvements. Alternative two accounts for the nutrient reduction provided by connecting sub-watershed 3 to the Roberts Road pond as well as the nutrient reduction provided by improving Roberts Road pond to a Level 2 Wet Pond.

In addition to the pond enhancement, a 40 feet wide perimeter around the pond will be converted from managed turf to forest/open space through plantings and conservation. This land conversion will further reduce the nutrient loading of the watershed by approximately 0.7 pounds of phosphorus per year, 4.7 pounds of nitrogen per year, and 1,299 pounds of total suspended solids/sediments per year. The water quality calculations for analysis of the proposed retrofit utilized the Virginia Runoff Reduction Method and are included as Appendix D.

A preliminary Opinion of Probable Construction Cost (OPCC) was prepared for the retrofit of Roberts Road Pond. The total construction cost per this OPCC is approximately \$209,000. A copy of the OPCC is included as Appendix C. Table 4-3 summarizes the nutrient removal rates and cost efficiency of the proposed retrofit.

Table 4-3: Nutrient Removal Efficiency – Alternative One			
	Nutrient Removal	Cost Efficiency / Year	Cost / 20-Year Maintenance Cycle
Phosphorus	31.9 lbs./yr.	\$ 6,600 /lbs./yr.	\$330 /lbs./yr.
Nitrogen	116.5 lbs./yr.	\$ 1,800 /lbs./yr.	\$90 /lbs./yr.
Total Suspended Solids	8,177 lbs./yr.	\$26 /lbs./yr.	\$1.30 /lbs./yr.

Table 4-4: Nutrient Removal Efficiency – Alternative Two			
	Nutrient Removal	Cost Efficiency / Year	Cost / 20-Year Maintenance Cycle
Phosphorus	64.4 lbs./yr.	\$ 6,500 /lbs./yr.	\$325 /lbs./yr.
Nitrogen	219.9 lbs./yr.	\$ 1,900 /lbs./yr.	\$95 /lbs./yr.
Total Suspended Solids	14,480 lbs./yr.	\$29 /lbs./yr.	\$1.45 /lbs./yr.

Kimley-Horn recommends that coordination with the USACE and DEQ be continued to confirm coverage of the proposed improvements under a USACE Nationwide Permit 27. The project's permit application should include a proposal for success monitoring that will meet with USACE approval. Kimley-Horn also recommends hydraulic analysis of the proposed retrofit be completed to confirm the capacity of the pond for 100-year storm events. If this analysis determines that the pond does not have adequate capacity, the design of a spillway as part of the retrofit is also recommended.

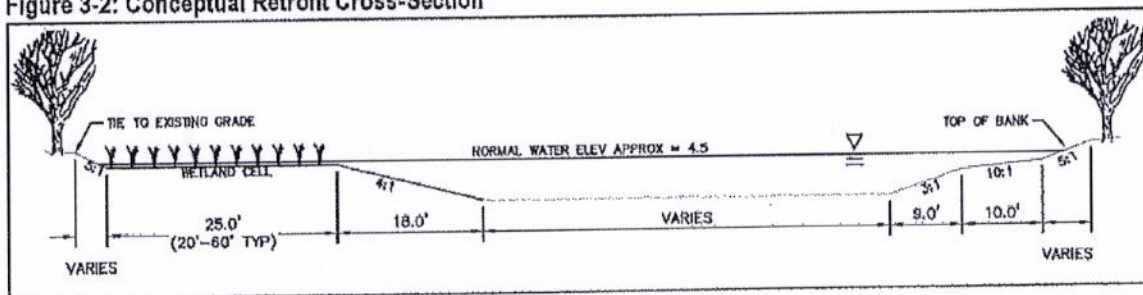
The Alternative One retrofit has an anticipated phosphorus removal of 31.9 pounds, an OPCC of \$209,000, and a cost efficiency of \$6,600 per pound of phosphorus per year. The Alternative Two retrofit has an anticipated phosphorus removal of 64.4 pounds, an OPCC of \$417,000, and a cost efficiency of \$6,500 per pound of phosphorus per year. This project will assist the City in meeting its target TMDL goals as well as provide improvement of natural habitat through the creation of wetlands and forest/open space.



Figure 2-1: Site Sub-Watershed Delineation Map



Figure 3-2: Conceptual Retrofit Cross-Section





# Kimley»Horn

Project: Roberts Road Alt 1

Project #: 113057069

Date: 10/21/2014

Locality: Norfolk (City)

LAND USE TYPE	C	CN
IMPERVIOUS	0.95	98
MANAGED TURF	0.25	80
FOREST/ OPEN SPACE	0.05	77

Drainage Area Summary						
Site Name	Drainage Area	Impervious	Managed Turf	Forest/Open Space	C	CN
Sub-Watershed 1 - Pre Retrofit	48.15 ac	26.05 ac	19.91 ac	2.20 ac	0.62	89.6
Sub-Watershed 2 - Pre Retrofit	10.33 ac	6.45 ac	3.48 ac	0.40 ac	0.68	91.1
Sub-Watershed 3 - Pre Retrofit	53.74 ac	26.30 ac	24.32 ac	3.12 ac	0.58	88.6
Total Site - Pre Retrofit	112.21 ac	58.80 ac	47.71 ac	5.70 ac	0.61	89.3
Total Site - Post Retrofit	112.21 ac	58.80 ac	46.11 ac	7.30 ac	0.60	89.2

Pond Retrofit Summary			
Site Name	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pre-Retrofit	71.5 lbs/yr	227.8 lbs/yr	13,755 lbs/yr
Post-Retrofit	102.7 lbs/yr	339.5 lbs/yr	20,633 lbs/yr
Net Benefit	31.2 lbs/yr	111.7 lbs/yr	6,878 lbs/yr

Nutrient Removal Summary			
Improvement	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pond Retrofit	31.2 lbs/yr	111.7 lbs/yr	6,878 lbs/yr
Land Conversion	0.7 lbs/yr	4.7 lbs/yr	1,299 lbs/yr
Net Benefit	31.9 lbs/yr	116.5 lbs/yr	8,177 lbs/yr

Water Quality Volume					
	Elevation (feet)	Area (feet)	Inc. Vol.	Total Volume	Total Volume
Normal Water	4.5	136,583	0 cf	0 cu-ft	0 ac-ft
	3.5	119,443	128,013 cf	128,013 cu-ft	2.94 ac-ft
	2.5	114,428	116,936 cf	244,949 cu-ft	5.62 ac-ft
	1.5	109,470	111,949 cf	356,897 cu-ft	8.19 ac-ft
	0.5	104,571	107,020 cf	463,918 cu-ft	10.65 ac-ft
	-0.5	99,732	102,152 cf	566,069 cu-ft	13.00 ac-ft
	-1.5	94,955	97,344 cf	663,413 cu-ft	15.23 ac-ft

# KimleyHorn

Project: Roberts Road Alt 2

Project #: 113057069

Date: 10/21/2014

Locality: Norfolk (City)

LAND USE TYPE	C	CN
IMPERVIOUS	0.95	98
MANAGED TURF	0.25	80
FOREST/ OPEN SPACE	0.05	77

Drainage Area Summary						
Site Name	Drainage Area	Impervious	Managed Turf	Forest/Open Space	C	CN
Sub-Watershed 1 - Pre Retrofit	48.15 ac	26.05 ac	19.91 ac	2.20 ac	0.62	89.6
Sub-Watershed 2 - Pre Retrofit	10.33 ac	6.45 ac	3.48 ac	0.40 ac	0.68	91.1
Sub-Watershed 3 - Pre Retrofit	53.74 ac	26.30 ac	24.32 ac	3.12 ac	0.58	88.6
Total Site - Pre Retrofit	112.21 ac	58.80 ac	47.71 ac	5.70 ac	0.61	89.3
Total Site - Post Retrofit	112.21 ac	58.80 ac	46.11 ac	7.30 ac	0.60	89.2

Nutrient Removal Summary			
Site Name	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pre-Retrofit	38.9 lbs/yr	124.4 lbs/yr	7,452 lbs/yr
Post-Retrofit	102.7 lbs/yr	339.5 lbs/yr	20,633 lbs/yr
Net Benefit	63.7 lbs/yr	215.2 lbs/yr	13,181 lbs/yr

Nutrient Removal Summary			
Improvement	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pond Retrofit	63.7 lbs/yr	215.2 lbs/yr	13,181 lbs/yr
Land Conversion	0.7 lbs/yr	4.7 lbs/yr	1,299 lbs/yr
Net Benefit	64.4 lbs/yr	219.9 lbs/yr	14,480 lbs/yr

Water Quality Volume					
	Elevation (feet)	Area (feet)	Inc. Vol.	Total Volume	Total Volume
Normal Water	4.5	136,583	0 cf	0 cu-ft	0 ac-ft
	3.5	119,443	128,013 cf	128,013 cu-ft	2.94 ac-ft
	2.5	114,428	116,936 cf	244,949 cu-ft	5.62 ac-ft
	1.5	109,470	111,949 cf	356,897 cu-ft	8.19 ac-ft
	0.5	104,571	107,020 cf	463,918 cu-ft	10.65 ac-ft
	-0.5	99,732	102,152 cf	566,069 cu-ft	13.00 ac-ft
	-1.5	94,955	97,344 cf	663,413 cu-ft	15.23 ac-ft



Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014

To be used w/ DRAFT 2013 BMP Standards and Specifications

Site Data

Project Name: Roberts Road Pond Alt1

Date: October 2014

data input cells  
calculation cells  
constant values

Post-ReDevelopment Project & Land Cover Information

Total Disturbed Acreage

5.00

Constants

Annual Rainfall (inches)

46

Target Rainfall Event (inches)

1.00

Phosphorus EMC (mg/L)

0.26

Nitrogen EMC (mg/L)

1.86

Target Phosphorus Target Load (lb/acre/yr)

0.41

P

0.90

Pre-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	5.43	0.00	0.27	5.70
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	45.73	0.00	1.98	47.71
Impervious Cover (acres)	0.00	48.07	0.00	10.73	58.80
Total					112.21

Post-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	7.03	0.00	0.27	7.30
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	44.13	0.00	1.98	46.11
Impervious Cover (acres)	0.00	48.07	0.00	10.73	58.80
Total					112.21

Area Check

Okay

Okay

Okay

Okay

Rv Coefficients

	A soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

Land Cover Summary

Listed

Adjusted<sup>1</sup>

Pre-ReDevelopment

Forest/Open Space Cover (acres)	5.70	5.70
Composite Rv(forest)	0.03	0.03
% Forest	5%	5%
Managed Turf Cover (acres)	47.71	47.71
Composite Rv(turf)	0.20	0.20
% Managed Turf	43%	43%
Impervious Cover (acres)	58.80	58.80
Rv(impervious)	0.95	0.95
% Impervious	52%	52%
Total Site Area (acres)	112.21	112.21
Site Rv	0.59	0.59

Land Cover Summary

Post-ReDevelopment

Post-ReDevelopment New Impervious

Forest/Open Space Cover (acres)	7.30
Composite Rv(forest)	0.03
% Forest	7%
Managed Turf Cover (acres)	46.11
Composite Rv(turf)	0.20
% Managed Turf	41%
ReDev. Impervious Cover (acres)	58.80
Rv(impervious)	0.95
% Impervious	52%
Total ReDev. Site Area (acres)	112.21
ReDev. Site Rv	0.59
New Impervious Cover (acres)	0.00
Rv(impervious)	0.95
% Impervious	0%
Total New Dev. Site Area (acres)	0.00
New Dev. Site Rv	0.95

Pre-Development Treatment Volume (acre-ft)	5,4731	5,4731
Pre-Development Treatment Volume (cubic feet)	238,410	238,410
Pre-Development Load (TP) (lb/yr)	159.13	159.13

Post-Development Treatment Volume (acre-ft)	5,4505
Post-Development Treatment Volume (cubic feet)	237,423
Post-Development Load (TP) (lb/yr)	158.47

<sup>1</sup>Adjusted Land Cover Summary reflects the pre redevelopment land cover minus the pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requirement for the new impervious cover to meet the new development load limit is computed in Column I.

Maximum % Reduction Required Below Pre-ReDevelopment Load

20%

TP Load Reduction Required for Redeveloped Area (lb/yr)

31.17

Total Load Reduction Required (lb/yr)

31.17

TP Load Reduction Required for New Impervious Area (lb/yr)

0.00

Pre-Development Load (TN) (lb/yr)

1139.38

Post-Development Load (TN) (lb/yr)

1139.87



Site Results						
		D.A. A	D.A. B	D.A. C	D.A. D	D.A. E
	IMPERVIOUS COVER	58.80	0.00	0.00	0.00	0.00
	IMPERVIOUS COVER TREATED	58.80	0.00	0.00	0.00	0.00
	TURF AREA	47.71	1.00	0.00	0.00	0.00
	TURF AREA TREATED	47.71	1.00	0.00	0.00	0.00
	AREA CHECK	OK.	OK.	OK.	OK.	OK.
Phosphorous						
	TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	15.91				
	RUNOFF REDUCTION (cf)	73				
	PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	71.45				
	ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	187.68				
	REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 55.5 LB/YEAR!!				
Nitrogen (for information purposes)						
	RUNOFF REDUCTION (cf)	73				
	NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	227.79				
	ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	910.59				



Site Results					
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E
IMPERVIOUS COVER	32.50	0.00	0.00	0.00	0.00
IMPERVIOUS COVER TREATED	32.50	0.00	0.00	0.00	0.00
TURF AREA	23.39	1.00	0.00	0.00	0.00
TURF AREA TREATED	23.39	1.00	0.00	0.00	0.00
AREA CHECK	OK.	OK.	OK.	OK.	OK.
Phosphorous					
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	31.17				
RUNOFF REDUCTION (cf)	73				
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	38.92				
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	119.55				
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 7.7 LB/YEAR!!				
Nitrogen (for information purposes)					
RUNOFF REDUCTION (cf)	73				
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	124.35				
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	1009.32				

Site Results					
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E
IMPERVIOUS COVER	58.80	0.00	0.00	0.00	0.00
IMPERVIOUS COVER TREATED	58.80	0.00	0.00	0.00	0.00
TURF AREA	46.11	1.00	0.00	0.00	0.00
TURF AREA TREATED	46.11	1.00	0.00	0.00	0.00
AREA CHECK	OK.	OK.	OK.	OK.	OK.
Phosphorous					
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	31.17				
RUNOFF REDUCTION (cf)	73				
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	102.65				
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	55.82				
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 71.5 LB/YEAR!!				
Nitrogen (for information purposes)					
RUNOFF REDUCTION (cf)	73				
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	339.53				
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	794.14				



## Hague Level I Wet Pond



DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
APPLICATION FOR STORMWATER LOCAL ASSISTANCE FUND (SLAF)  
STORMWATER CAPITAL PROJECTS

**SECTION A - ORGANIZATIONAL DATA**

Name of Applicant: City of Norfolk

Applicant Address: 2233 McKann Ave  
Norfolk, VA 23509

Contact Person: Justin Shafer

Phone: 757-823-4048 Email: justin.shafer@norfolk.gov

Name of Engineer: Moffatt and Nichol

Engineer Address: 800 World Trade Center  
Norfolk, Virginia 23510

Contact Person: Brian Joyner

Phone: 757-628-8222 Email: BJoyner@moffattnichol.com

**SECTION B - PROPOSED FUNDING**

**PROJECT FUNDING**

a) Amount of SLAF Grant Funds Requested

263,976

	Source of Match Funds	Amount	CHECK BOX IF COMMITTED
1	Storm Water CIP	263,976	✓
2			
3			

b) Total Other Funding Available (1 + 2 + 3 ...) \*\*

263,976

c) Total Project Cost (a + b)

527,952

\*SLAF Grants provide up to 50% of project costs. Applicant must identify anticipated source(s) and amount(s) of match funds.

\*\*This amount must be at least equal to the amount of Grant Funds being requested

**SECTION C - WATER QUALITY DATA**

Location of Project Latitude 36.8567 Longitude -76.3008

(Latitude and Longitude of project is a required entry on this application. The points should be the nearest approximation of the center of your project. Please identify them in decimal degrees.)

Name of Stream / Waterbody impacted by stormwater runoff being addressed by the project

Elizabeth River

River Basin for Receiving Stream / Waterbody

James River



## SECTION D -BRIEF PROJECT DESCRIPTION AND STATEMENT OF NEED

Please include a description of project including: type of project (e.g. extended detention pond retrofit), size of area treated (acres), TMDL or impaired water the project addresses, if the project is relevant to a TMDL Implementation Plan, and other relevant information pertaining to the project. Describe the need for the proposed project. Needs should be in areas of restoring, protecting or preventing pollution in State waters.  
(attach additional pages if necessary)

The Hague Retention Basin project calls for retrofit of a muddy, frequently flooded area in Riverside Park adjacent to The Hague. The area serves a 17.89 acre watershed consisting of commercial and institutional development. The proposed project will construct a DEQ Level 1 Wet Pond in a low-lying area of the park where yard drains allow tidal waters from the Hague to rise over the grass. An increase of 17.8 lb/yr P removal will be gained. Additionally, a living shoreline is planned to replace the failing and eroding bulkhead adjacent to the project area. \$1.7 million in funding will be sought separate from this application to allow construction of both simultaneously.

The proposed BMP drains to the Hague, then the main channel of the Elizabeth River. The 2012 DEQ 303d list identifies these receiving waters as impaired for dissolved oxygen, PCB in fish tissue, and estuarine bioassessment. The Chesapeake Bay TMDL addresses impairment of the entire watershed for phosphorous, nitrogen, and sediment. Proposed improvements to this BMP will provide improved pollutant removal efficiency, which will assist in meeting the Bay TMDL and local impairments.

Feasibility analysis of the BMP is complete, with design anticipated to proceed in FY17, allowing time for funding towards adjacent restoration projects to be sought. Regardless of other funding, construction of the retention pond is scheduled for FY18. Funds are requested to allow a more rapid construction schedule of this and other currently planned projects, and to free funding for further proposed water quality projects.

## SECTION E - POLLUTION REDUCTION

The calculated Total Pounds (Per Year) of Total Phosphorous reduced from stormwater as a result of this project

=  pounds per year

The established methodology for calculating the TP reduction is outlined in Attachment A of the SLAF Guidelines. To verify calculations for pollution reduction, the following information is required with the application:

- 1) Print out the Site Data tab of the Virginia Runoff Reduction Method Spreadsheet showing the data entered and resultant TP load. Supporting documentation with rationale for parameter selection must be provided to demonstrate that the parameter estimates are valid for the project.
- 2) Provide Text to indicate which pollution reduction calculation methodology was selected, why it is appropriate for the project, the calculated phosphorus load reduction, any assumptions with supporting documentation, and parameters selected with rationale for selection (must be provided to demonstrate that estimates are valid for the project). All supporting calculations must be provided.
- 3) If the project is a retrofit of an existing BMP provide photographs showing the BMP before the upgrade. Provide text to describe the upgrade / enhancement and the incremental phosphorus load reduction achieved utilizing the SLAF guideline references, with supporting documentation. Rationale and calculated estimates BMP's current (former) efficiency must be provided.

**SECTION F - READINESS-TO-PROCEED**  
**PROJECT STATUS**

	Yes	No	N/A
Is the project included in Stormwater or Watershed Management Plan? (If Yes, attach documentation to application)	✓		
Is the project identified in current year Capital Improvement Plan or Annual Budget? (If Yes, attach documentation to application)		✓	
Is acquisition of land necessary to complete project?		✓	
Has the land necessary for the project already been acquired? (If Yes, attach documentation to application)			✓
Has an engineer been selected for project design? (If Yes, provide name)	✓		

**ANTICIPATED SCHEDULE**

	<i>Schedule Item Description</i>	<i>Date</i>
a.	Notice to Proceed on Design	July 1, 2017
b.	Completion of Plans/Specifications	January 15, 2018
c.	Plans and Specs Approved	February 26, 2018
d.	Advertise for Bids	March 11, 2018
e.	Bid Opening	April 3, 2018
f.	Award Contracts	July 1, 2018
g.	Estimated Construction Time (expressed in months)	4

**SECTION G -PROJECT BUDGET INFORMATION**

Legal / Administration	\$0.00
Land, Right-of-Way	\$0.00
Architectural Engineering Basic Fees	\$60000.00
Project Inspection Fees	\$0.00
Other (Explain)	\$0.00
Stormwater BMP Construction	371,467
Contingencies	\$96485.00
<b>TOTAL*</b>	<b>527,952 *</b>

\*This amount should be the exact same as the amount in Item c) Total Project Cost, Section B, Page 1.



## SECTION H

	Yes	No	N/A
Has applicant adopted a dedicated source of revenue to implement a stormwater control program in accordance with §15.2-2114? (If so, attach documentation)	✓		
Is the applicant subject to an MS4 discharge permit in accordance with §62.1-44.5?	✓		
Does the project address requirements of your MS4 permit? If yes, explain:	✓		
The City of Norfolk MS4 permit calls for the City to develop, implement and refine pollution prevention measures, management or removal techniques, and other appropriate means to control the quality and quantity of storm water discharged from the MS4. The permit further calls for a program to utilize structural and source control measures to reduce pollutants from commercial and residential areas. The project described above will provide both quality and quantity improvements to water discharged through the City's MS4, meeting a requirement of the permit.			

Name of MS4 Permittee if different from Applicant

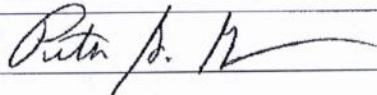
## SECTION I - ASSURANCES AND CERTIFICATIONS

The undersigned representative of the applicant certifies that the information contained herein and the attached statements and exhibits are true, correct and complete to the best of their knowledge and belief. The undersigned also agrees to clarify or supplement information pertaining to this application upon request.

Name: Pete Garner

Title: Operations Engineering Manager

Signature:



Date: October 21, 2014

## SECTION J - ATTACHMENTS

Include all required attachments appropriate for your application. The following is a list of potential attachments:

- 1) Documentation supporting the Pollution Reduction methodology, calculations, text, etc. as described in Section E.
- 2) Excerpt from Stormwater or Watershed Management Plan. (Section F)
- 3) Excerpt from Capital Improvement Plan or Annual Budget. (Section F)
- 4) Documentation of land acquisition. (Section F)
- 5) Documentation of Dedicated Revenue Source for Stormwater Management Program. (Section H)

### 5.2.1. Retention Pond

#### Concept Description

Retention ponds (wet ponds) are designed to provide a permanent pool of water, which acts as a calming mechanism to promote settlement of suspended solids as stormwater is routed into the pond. The basins are typically landscaped and planted to promote biological uptake as well.

Critical features of a retention pond include:

- 15 – 20 acre minimum watershed to ensure a permanent pool of water is maintained unless groundwater can be shown to support smaller basins.
- 20-foot wide vegetated buffer and other pretreatment features to filter out pollutants prior to introduction to the main water body.
- Attention to attractiveness and safety features commensurate with its level of public exposure.

#### Concept Placement

Candidate sites for a retention pond would be limited to the open areas near the Hague (Figure 9). Other locations may work from a hydraulic standpoint, but aesthetic and safety concerns would likely keep such concepts from being selected.

A proposed pond in some or all of the area indicated would likewise need to address public safety and aesthetic concerns, but since it is within an open area away from developed residential areas, there would be greater opportunity to incorporate attractive elements such as a walking trail, benches, and decorative landscaping into the design.

This area is also immediately adjacent to and partially disturbed by ongoing improvements to Brambleton Avenue.

#### Treatment Effectiveness

Excess storage capacity further increases the residence time of the stormwater to enhance treatment effectiveness. The Virginia Stormwater Management Handbook provides three design levels (Retention Basin I – III) to achieve different removal rates, ranging from 40% to 65% reductions, based on the size of the designed basin relative to the design rain volume (i.e. water quality volume).

The concept pond would receive runoff primarily from minor Brambleton Avenue drainage systems (D14171, D14165, D14158, D14153, D14149). Based on preliminary calculations, a Retention Basin I could be achieved, which is based on providing a storage volume of 3 times the calculated water quality volume associated with the 17.89 acre total basin size.

Using the CBP pollutant removal rate protocol for retrofit BMPs, this achieves 57%, 37%, and 74% reductions in Total Phosphorus, Total Nitrogen, and Total Suspended Solids, respectively. This corresponds to annual reductions of 17.80 lbs/yr TP, 69.99 lbs/yr TN, and 5.05 tons/year TSS.



### Maintenance

Routine maintenance of retention ponds generally consists of annual visual inspections and general landscape maintenance. Sediment removal frequency is based on the design sediment storage volume. Typical designs are based on removing sediment every 5 to 10 years. Permits and sediment testing are typically necessary prior to removing the sediment.

### Order-of-Magnitude Cost

A conceptual opinion of probable construction cost for the footprint shown on Figure 9, including incorporation of pedestrian walkway, amenities, and landscaping is \$550,000.

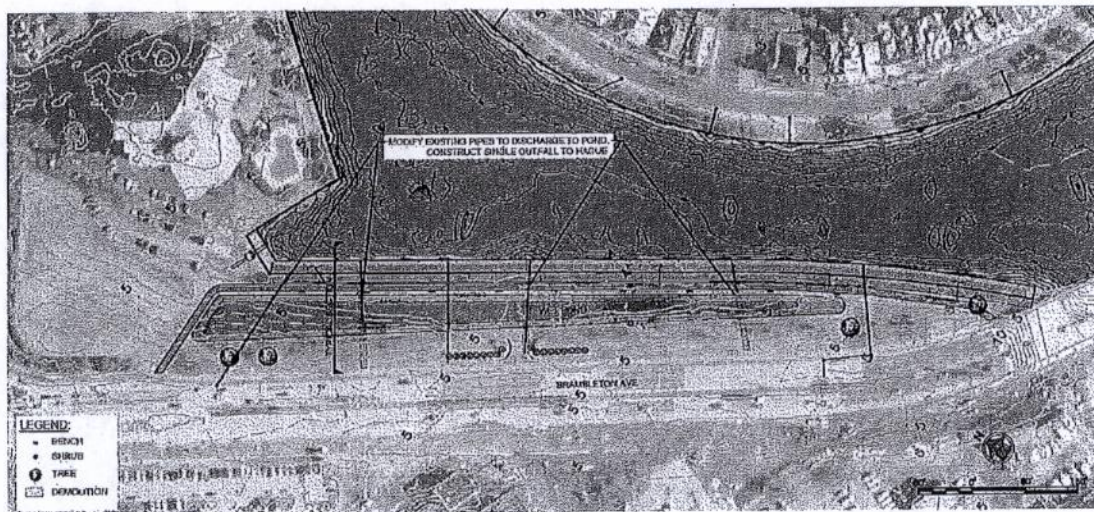


Figure 9: Retention pond concept

Table 6: Retention pond concept summary

Order-of-Magnitude Cost	Drainage Area Treated (Acres)	TP Reduction (lbs/yr)	TN Removal (lbs/yr)	TSS Removal (tons/yr)
\$550,000	17.89	17.80	69.99	5.05



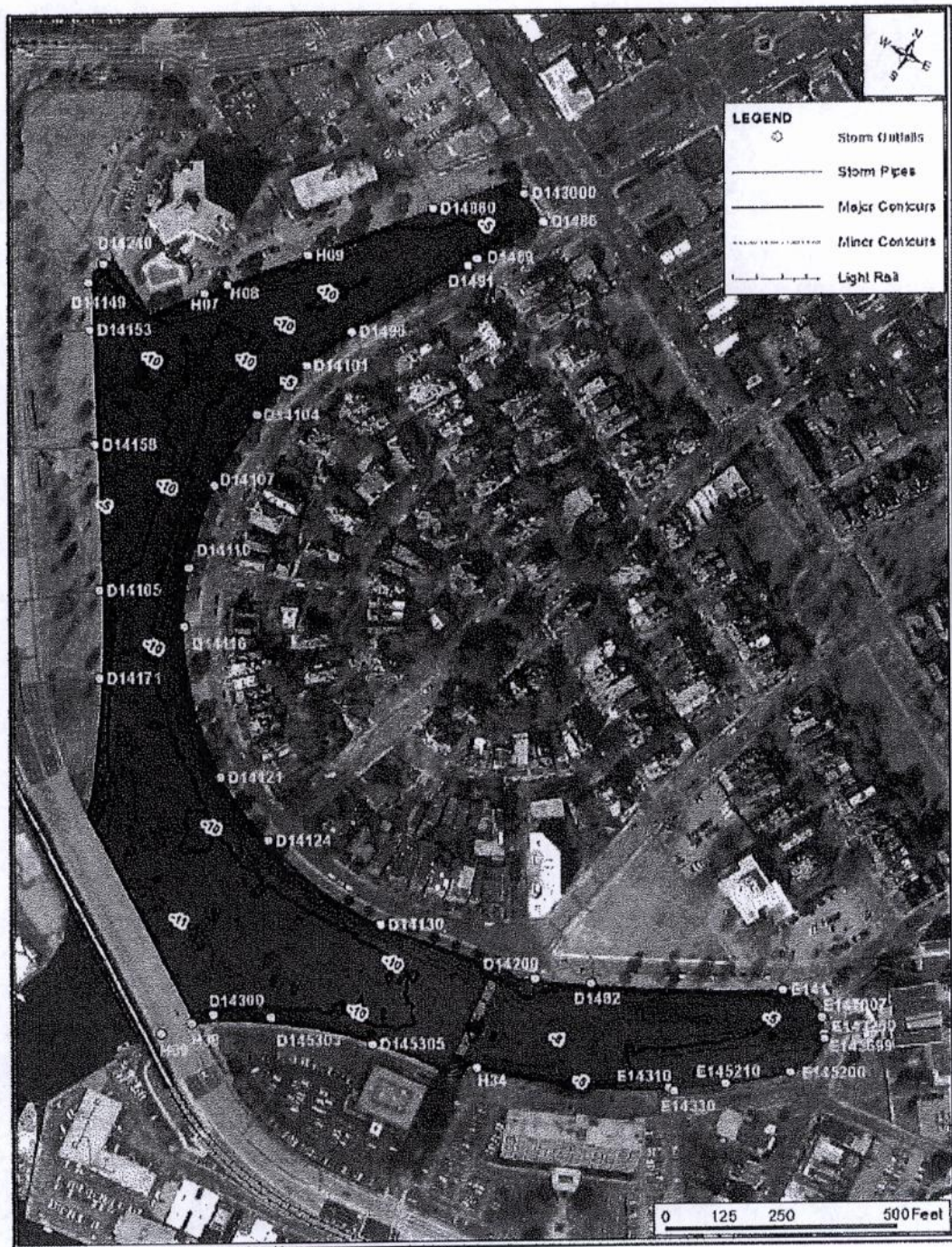
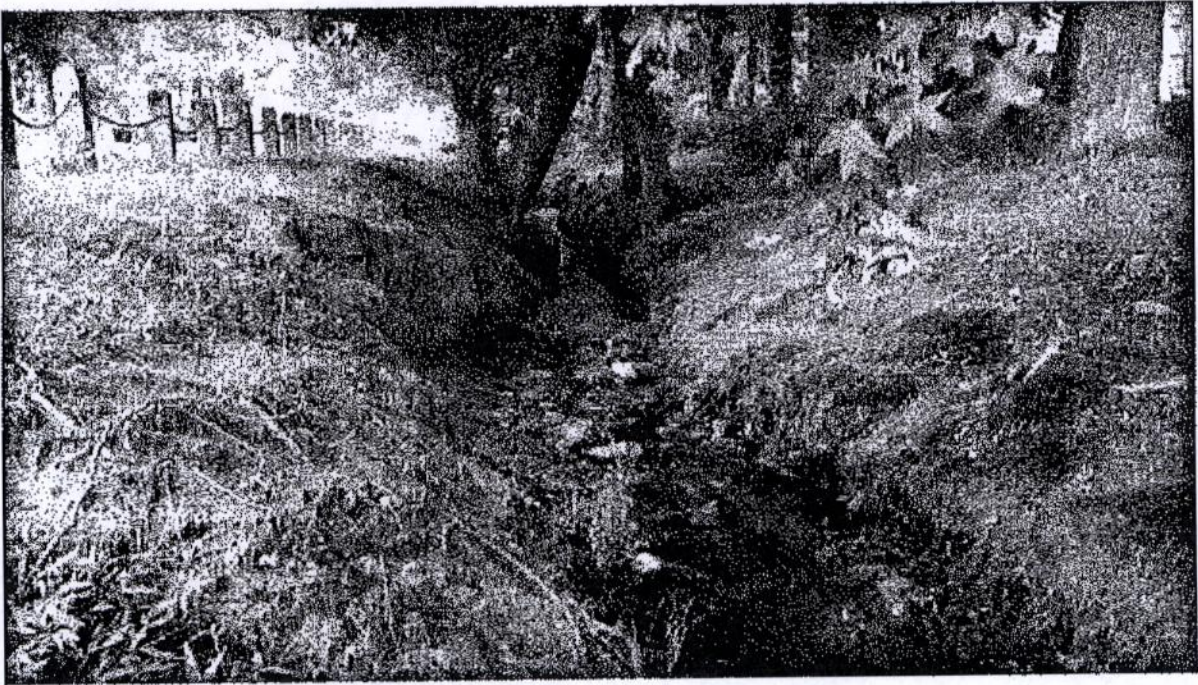


Figure 2: Survey contours and outfalls



## Templar Blvd Stream Restoration



DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
APPLICATION FOR STORMWATER LOCAL ASSISTANCE FUND (SLAF)  
STORMWATER CAPITAL PROJECTS

**SECTION A - ORGANIZATIONAL DATA**

Name of Applicant: City of Norfolk

Applicant Address: 2233 McKann Ave  
Norfolk, VA 23509

Contact Person: Justin Shafer

Phone: 757-823-4048 Email: justin.shafer@norfolk.gov

Name of Engineer: Kimley-Horn and Associates, Inc

Engineer Address: 4500 Main St  
Suite 500  
Virginia Beach, VA 23455

Contact Person: Karl Mertig

Phone: 757-355-6671 Email: Karl.Mertig@kimley-horn.com

**SECTION B - PROPOSED FUNDING**

**PROJECT FUNDING**

a) Amount of SLAF Grant Funds Requested \$71000.00

	Source of Match Funds	Amount	CHECK BOX IF COMMITTED
1	Storm Water CIP	\$71000.00	✓
2			
3			

b) Total Other Funding Available (1 + 2 + 3 ...) \*\* \$71000.00

c) Total Project Cost (a + b) 142,000

\*SLAF Grants provide up to 50% of project costs. Applicant must identify anticipated source(s) and amount(s) of match funds.

\*\*This amount must be at least equal to the amount of Grant Funds being requested

**SECTION C - WATER QUALITY DATA**

Location of Project Latitude 36.9198 Longitude -76.2391

(Latitude and Longitude of project is a required entry on this application. The points should be the nearest approximation of the center of your project. Please identify them in decimal degrees.)

Name of Stream / Waterbody impacted by stormwater runoff being addressed by the project  
Pretty Lake, Little Creek

River Basin for Receiving Stream / Waterbody  
Chesapeake Bay



## SECTION D -BRIEF PROJECT DESCRIPTION AND STATEMENT OF NEED

Please include a description of project including: type of project (e.g. extended detention pond retrofit), size of area treated (acres), TMDL or impaired water the project addresses, if the project is relevant to a TMDL Implementation Plan, and other relevant information pertaining to the project. Describe the need for the proposed project. Needs should be in areas of restoring, protecting or preventing pollution in State waters.  
(attach additional pages if necessary)

The Templar Blvd project focuses on a highly altered and erosive stream channel which currently serves as part of Norfolk's storm water ditch network. The channel section drains a 124.8 acre watershed consisting of residential and institutional development. The proposed restoration will stabilize the eroded left bank and re-establish vegetation. Riffle pools will be added utilizing rock and log cross-vanes. A bank-full bench will also be established and planted with wetland vegetation. The forest landscape adjacent to the right bank will be maintained. The project also ties into previous stabilization work immediately upstream and planned culvert work on the downstream end.

The stream channel drains to Little Creek, which itself drains directly to the Chesapeake Bay. The 2012 DEQ 303d list identifies these receiving waters as impaired for PCB in fish tissue and aquatic plants. The Chesapeake Bay TMDL addresses impairment of the entire watershed for phosphorous, nitrogen, and sediment. Proposed improvements to this BMP will provide improved pollutant removal efficiency, which will assist in meeting the Bay TMDL and local impairments.

Feasibility analysis of the restoration is complete, with design anticipated to proceed by the end of the current fiscal year, and with construction scheduled for FY16. Funds are requested to allow a more rapid construction schedule of this and other currently planned projects, and to free funding for further proposed water quality projects.

## SECTION E - POLLUTION REDUCTION

The calculated Total Pounds (Per Year) of Total Phosphorous reduced from stormwater as a result of this project

= 13.5 pounds per year

The established methodology for calculating the TP reduction is outlined in Attachment A of the SLAF Guidelines. To verify calculations for pollution reduction, the following information is required with the application:

1) Print out the Site Data tab of the Virginia Runoff Reduction Method Spreadsheet showing the data entered and resultant TP load. Supporting documentation with rationale for parameter selection must be provided to demonstrate that the parameter estimates are valid for the project.

2) Provide Text to indicate which pollution reduction calculation methodology was selected, why it is appropriate for the project, the calculated phosphorus load reduction, any assumptions with supporting documentation, and parameters selected with rationale for selection (must be provided to demonstrate that estimates are valid for the project). All supporting calculations must be provided.

3) If the project is a retrofit of an existing BMP provide photographs showing the BMP before the upgrade. Provide text to describe the upgrade / enhancement and the incremental phosphorus load reduction achieved utilizing the SLAF guideline references, with supporting documentation. Rationale and calculated estimates BMP's current (former) efficiency must be provided.

**SECTION F - READINESS-TO-PROCEED**  
**PROJECT STATUS**

	Yes	No	N/A
Is the project included in Stormwater or Watershed Management Plan? (If Yes, attach documentation to application)	✓		
Is the project identified in current year Capital Improvement Plan or Annual Budget? (If Yes, attach documentation to application)	✓		
Is acquisition of land necessary to complete project?		✓	
Has the land necessary for the project already been acquired? (If Yes, attach documentation to application)			✓
Has an engineer been selected for project design? (If Yes, provide name)	✓		

**ANTICIPATED SCHEDULE**

	<i>Schedule Item Description</i>	<i>Date</i>
a.	Notice to Proceed on Design	June 1, 2015
b.	Completion of Plans/Specifications	December 1, 2015
c.	Plans and Specs Approved	January 15, 2016
d.	Advertise for Bids	January 31, 2016
e.	Bid Opening	February 23, 2016
f.	Award Contracts	May 23, 2016
g.	Estimated Construction Time (expressed in months)	3

**SECTION G -PROJECT BUDGET INFORMATION**

Legal / Administration	\$0.00
Land, Right-of-Way	\$0.00
Architectural Engineering Basic Fees	\$50000.00
Project Inspection Fees	\$0.00
Other (Explain)	\$0.00
Stormwater BMP Construction	\$82800.00
Contingencies	\$9200.00
<b>TOTAL*</b>	<b>142,000*</b>

\*This amount should be the exact same as the amount in Item c) Total Project Cost, Section B, Page 1.



## SECTION H

	Yes	No	N/A
Has applicant adopted a dedicated source of revenue to implement a stormwater control program in accordance with §15.2-2114? (If so, attach documentation)	✓		
Is the applicant subject to an MS4 discharge permit in accordance with §62.1-44.5?	✓		
Does the project address requirements of your MS4 permit? If yes, explain:	✓		
<p>The City of Norfolk MS4 permit calls for the City to develop, implement and refine pollution prevention measures, management or removal techniques, and other appropriate means to control the quality and quantity of storm water discharged from the MS4. The permit further calls for a program to utilize structural and source control measures to reduce pollutants from commercial and residential areas. The project described above will provide both quality and quantity improvements to water discharged through the City's MS4, meeting a requirement of the permit.</p>			

Name of MS4 Permittee if different from Applicant

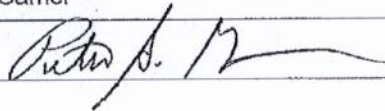
## SECTION I - ASSURANCES AND CERTIFICATIONS

The undersigned representative of the applicant certifies that the information contained herein and the attached statements and exhibits are true, correct and complete to the best of their knowledge and belief. The undersigned also agrees to clarify or supplement information pertaining to this application upon request.

Name:

Title:

Signature:



Date:

## SECTION J - ATTACHMENTS

Include all required attachments appropriate for your application. The following is a list of potential attachments:

- 1) Documentation supporting the Pollution Reduction methodology, calculations, text, etc. as described in Section E.
- 2) Excerpt from Stormwater or Watershed Management Plan. (Section F)
- 3) Excerpt from Capital Improvement Plan or Annual Budget. (Section F)
- 4) Documentation of land acquisition. (Section F)
- 5) Documentation of Dedicated Revenue Source for Stormwater Management Program. (Section H)

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
APPLICATION FOR STORMWATER LOCAL ASSISTANCE FUND (SLAF)  
STORMWATER CAPITAL PROJECTS

**SECTION A - ORGANIZATIONAL DATA**

Name of Applicant:	City of Norfolk		
Applicant Address:	2233 McKann Ave Norfolk, VA 23509		
Contact Person:	Justin Shafer		
Phone:	757-823-4048	Email:	justin.shafer@norfolk.gov
Name of Engineer:	Kimley-Horn and Associates, Inc		
Engineer Address:	4500 Main St Suite 500 Virginia Beach, VA 23455		
Contact Person:	Karl Mertig		
Phone:	757-355-6671	Email:	Karl.Mertig@kimley-horn.com

**SECTION B - PROPOSED FUNDING**

**PROJECT FUNDING**

a) Amount of SLAF Grant Funds Requested \$84500.00

	Source of Match Funds	Amount	CHECK BOX IF COMMITTED
1	Storm Water CIP	159,186	✓
2			
3			

b) Total Other Funding Available (1 + 2 + 3 ...) 159,186

c) Total Project Cost (a + b) 243,686

\*SLAF Grants provide up to 50% of project costs. Applicant must identify anticipated source(s) and amount(s) of match funds.

\*\*This amount must be at least equal to the amount of Grant Funds being requested.

**SECTION C - WATER QUALITY DATA**

Location of Project	Latitude	36.8733	Longitude	-76.3055
(Latitude and Longitude of project is a required entry on this application. The points should be the nearest approximation of the center of your project. Please identify them in decimal degrees.)				
Name of Stream / Waterbody impacted by stormwater runoff being addressed by the project				
Elizabeth River				
River Basin for Receiving Stream / Waterbody				
James River				



## EXECUTIVE SUMMARY

The City of Norfolk, Virginia requested that Kimley-Horn and Associates, Inc. (Kimley-Horn) conduct a feasibility study to evaluate water quality improvement opportunities and potential generation of nutrient credits for the Templar Boulevard Stream (the Site) in Norfolk, Virginia. The primary goal of the proposed improvements will be to reduce nutrient loading in Little Creek and thus, the Chesapeake Bay and provide an opportunity for the City to obtain nutrient reduction credits. Secondary benefits will include the improvement of natural habitat through stream restoration.

The Templar Boulevard Stream is located directly south of the 200-block of Templar Boulevard between Pythian Avenue and Carlton Street. The channel is located within the right of way of Templar Boulevard in the South Bayview neighborhood, and is owned by the City of Norfolk. The channel appears to have been straightened with most of the original stream floodplain filled, constricted or otherwise altered. The Templar Boulevard stream is incised along the project reach and has little sinuosity. The bed materials consist primarily of sand. Bank Erosion Hazard Index (BEHI) and Near Bank Stress (NBS) assessments were completed to evaluate multiple erosional processes and potential for disproportionate energy distribution along stream banks. The BEHI and NBS assessments were then combined to predict an estimate for annual stream bank erosion rates.

After completing Site reconnaissance, document review, and hydrologic analysis Kimley-Horn determined that the most effective retrofit opportunity is the restoration/stabilization of the Templar Boulevard Stream utilizing the *"Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects"* dated January 17, 2014. Urban stream restoration of the channel would consist of stabilizing the left bank (facing downstream) in order to stop the excessive erosion occurring.

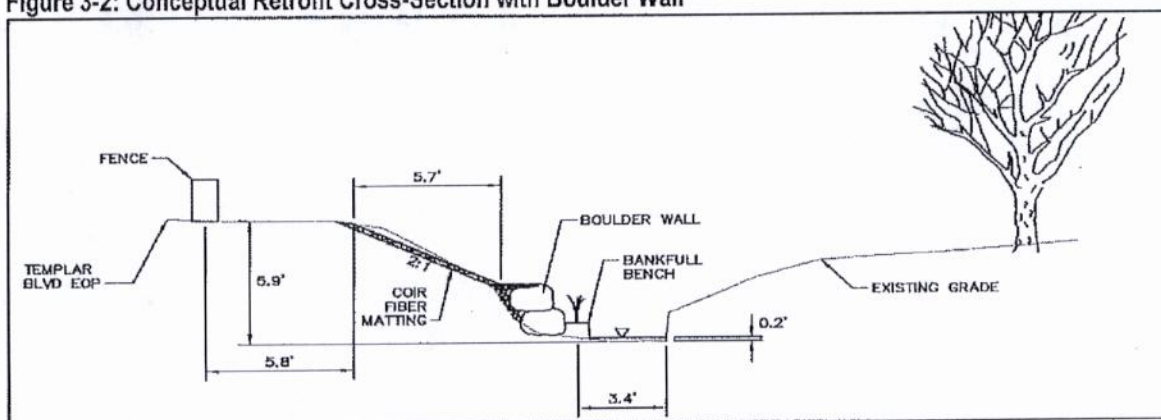
Figure 3-1: Conceptual Retrofit Plan



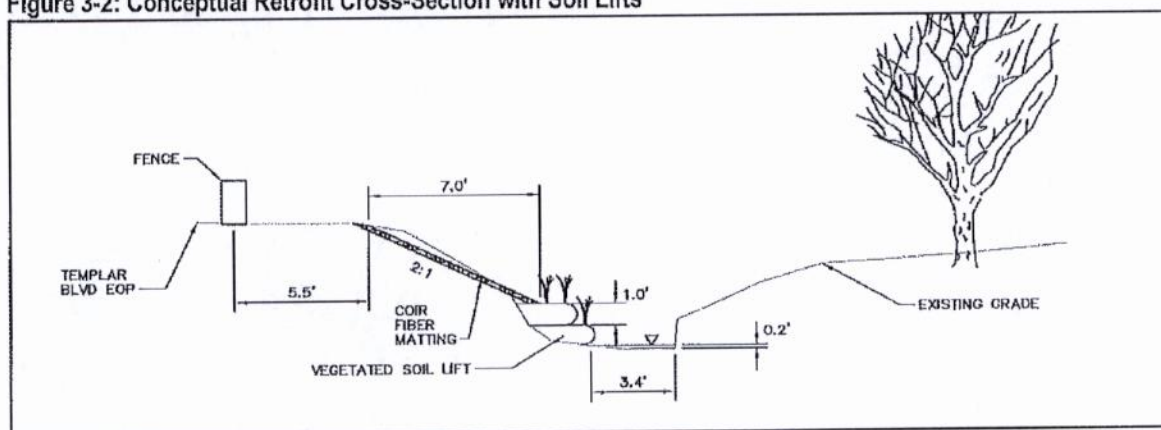


Figure 3-1, above, depicts the conceptual retrofit plan and Figures 3-2 and 3-2 depict conceptual retrofit cross-sections. A full size conceptual plan and cross-section details are included as Appendix A. Stabilization would be performed in accordance with natural channel design techniques and would include re-grading the existing vertical bank to create a stable slope and wider flood prone area, create a bankfull bench, and establish vegetation along the bank by adding topsoil, establishing herbaceous cover, and planting shrubs and trees. This work would also include correcting the profile of the channel to improve riffle-pool sequencing which will in turn improve water quality and aquatic habitat. The proposed design would also add bed form diversity (riffles and pools) and structures such as rock cross vanes and log vanes can be used to improve bed form diversity and protect against bank erosion. In addition to the restoration of the left bank, the 3.5 feet wide area situated parallel to Templar Boulevard will be converted from managed turf to forest/open space through plantings and conservation.

**Figure 3-2: Conceptual Retrofit Cross-Section with Boulder Wall**



**Figure 3-2: Conceptual Retrofit Cross-Section with Soil Lifts**



By following Protocol 1 of *Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* and restoring the left channel bank, the annual phosphorus loading could be reduced by up to 13.6 pounds, the annual nitrogen loading could be reduced by up to 29.6 pounds, and the annual total suspended solids/sediments could be reduced by 25,783 pounds. In addition to the restoration of the channel, the left top of bank situated parallel to Templar Boulevard will be converted from managed turf to forest/open space through plantings and conservation. This land conversion will further reduce the nutrient loading of the watershed. The water quality calculations are included as Appendix D.



A preliminary Opinion of Probable Cost (OPCC) was prepared for the Templar Boulevard stream restoration. The OPCC includes major aspects of the restoration design as described above. The total construction cost per this OPCC is approximately \$92,000. A copy of the OPCC is included as Appendix C. Table 4-3 summarizes the nutrient removal rates and cost efficiency of the proposed channel restoration.

Table 4-3: Nutrient Removal Efficiency		
	Nutrient Removal	Cost Efficiency / Year
Phosphorus	13.7 lbs./yr.	\$6,800 /lbs./yr.
Nitrogen	29.8 lbs./yr.	\$3,100 /lbs./yr.
<b>Total Suspended Solids</b>	<b>27,100 lbs./yr.</b>	<b>\$3.39 /lbs./yr.</b>

Kimley-Horn recommends that coordination with the USACE and DEQ be continued to confirm coverage of the proposed improvements under a USACE Nationwide Permit 27. The project's permit application should include a proposal for success monitoring that will meet with USACE approval. Kimley-Horn also recommends a full geomorphic survey including longitudinal profile, bar samples, stable radius of curvature, and belt width to determine the design dimension, pattern, and profile. A hydraulic analysis of the proposed retrofit should be completed to confirm the capacity of the channel. Additionally, Kimley-Horn recommends a full geotechnical investigation to determine the composition of the in-situ soils and their suitability for re-use for bankfull benches and wetland plantings.

The proposed retrofit could potentially reduce annual phosphorus loading by up to 13.7 pounds and has a probable construction cost of approximately \$92,000. This retrofit has an anticipated phosphorus removal efficiency of \$6,700 per pound per year and will assist the City in meeting its target TMDL goals as well as provide improvement of natural habitat through the creation of wetlands and conserved forest area.







# Kimley»Horn

Project: Templar Boulevard  
 Project #: 113057069  
 Date: 10/21/2014  
 Locality: Norfolk (City)

Drainage Area Summary				
Site Name	Drainage Area (ac)	Impervious (ac)	Managed Turf (ac)	Forest/Open Space (ac)
Pre-Retrofit	126.18	61.50	61.15	3.53
Post-Retrofit	126.18	61.50	61.07	3.61

Nutrient	Sediment Load (tons/yr.)	Nutrient Concentration (lbs./ton)	Approximate Restoration Efficiency	Land Conversion (lbs./yr.)	Total Nutrient Removal (lbs./yr.)
Phosphorus Removal	25.8	1.05	50%	0.03	13.6
Nitrogen Removal	25.8	2.28	50%	0.24	29.6

Nutrient Removal Summary			
Improvement	Phosphorus Removal	Nitrogen Removal	TSS Removal
Stream Restoration	13.6 lbs/yr	29.6 lbs/yr	25,783 lbs/yr
Land Conversion	0.1 lbs/yr	0.2 lbs/yr	1,317 lbs/yr
Net Benefit	13.7 lbs/yr	29.9 lbs/yr	27,100 lbs/yr

## Left Banks

Station	BEHI	NBS	Bank Erosion Rate (ft/yr)	Length of Bank (ft)	Study Bank Height (ft)	Erosion Subtotal (ft <sup>3</sup> /yr)
P4	VH	VH	0.80	86	3	206
P5	E	L	0.30	116	3	104
P6	VH	H	0.80	20	3	48
P7	H	L	0.15	106	3	48
P8	H	H	0.50	86	3	129
Total Erosion (ft <sup>3</sup> /yr)						535.5
Total Erosion (yds <sup>3</sup> /yr)						19.8
Total Erosion (tons/yr)						25.8
Total Erosion (tons/yr/ft)						0.062

## Right Banks

Station (ft)	BEHI	NBS	Bank Erosion Rate (ft/yr)	Length of Bank (ft)	Study Bank Height (ft)	Erosion Subtotal (ft <sup>3</sup> /yr)
P1	VH	VH	0.80	87	4	278
P2	M	L	0.07	192	4	50
P3	M	H	0.30	105	4	126
P4	H	H	0.50	34	4	68
Total Erosion (ft <sup>3</sup> /yr)						522.3
Total Erosion (yds <sup>3</sup> /yr)						19.3
Total Erosion (tons/yr)						25.1
Total Erosion (tons/yr/ft)						0.060



# Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014

To be used w/ DRAFT 2013 BMP Standards and Specifications

Site Data

Project Name: Templar Stream Restoration

Date: October 2014

data input cells  
calculation cells  
constant values

## Post-ReDevelopment Project & Land Cover Information

Total Disturbed Acreage 0.90

### Constants

Annual Rainfall (inches)

46

Target Rainfall Event (inches)

1.00

Phosphorus EMC (mg/L)

0.26

Nitrogen EMC (mg/L)

1.88

Target Phosphorus Target Load (lb/acre/yr)

0.41

P

0.90

### Pre-ReDevelopment Land Cover (acres)

A soils

B Soils

C Soils

D Soils

Totals

Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land

0.00

1.54

1.99

0.00

3.53

Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed

0.00

41.52

16.79

2.84

61.15

Impervious Cover (acres)

0.00

34.30

14.36

12.84

61.50

Total

126.18

### Post-ReDevelopment Land Cover (acres)

A soils

B Soils

C Soils

D Soils

Totals

Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land

0.00

1.67

2.04

0.00

3.61

Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed

0.00

41.49

16.74

2.84

61.07

Impervious Cover (acres)

0.00

34.30

14.36

12.84

61.50

Total

126.18

### Area Check

Okay

Okay

Okay

Okay

### Rv Coefficients

A soils

B Soils

C Soils

D Soils

Forest/Open Space

0.02

0.03

0.04

0.05

Managed Turf

0.15

0.20

0.22

0.25

Impervious Cover

0.95

0.95

0.95

0.95

### Land Cover Summary

Listed

Adjusted<sup>1</sup>

### Land Cover Summary

### Land Cover Summary

Pre-ReDevelopment

Post-ReDevelopment

Post-ReDevelopment New Impervious

Forest/Open Space Cover (acres)

3.53

3.53

Forest/Open Space Cover (acres)

3.61

Composite Rv(forest)

0.04

0.04

Composite Rv(forest)

0.04

% Forest

3%

3%

% Forest

3%

Managed Turf Cover (acres)

61.15

61.15

Managed Turf Cover (acres)

61.07

Composite Rv(turf)

0.21

0.21

Composite Rv(turf)

0.21

% Managed Turf

48%

48%

% Managed Turf

48%

Impervious Cover (acres)

61.50

61.50

ReDev. Impervious Cover (acres)

61.50

New Impervious Cover (acres)

0.00

Rv(impervious)

0.95

0.95

Rv(impervious)

0.95

Rv(impervious)

0.95

% Impervious

48%

48%

% Impervious

48%

% Impervious

Check Area

Total Site Area (acres)

126.18

126.18

Total ReDev. Site Area (acres)

126.18

Total New Dev. Site Area (acres)

0.00

Site Rv

0.56

0.56

ReDev. Site Rv

0.56

New Dev. Site Rv

0.95

Pre-Development Treatment Volume (acre-ft)

5.9383

5.9383

Post-Development Treatment Volume (acre-ft)

5.9371

Post-Development Treatment Volume (acre-ft)

0.0000

Pre-Development Treatment Volume (cubic feet)

258,671

258,671

Post-Development Treatment Volume (cubic feet)

258,615

Post-Development Treatment Volume (cubic feet)

0

Pre-Development Load (TP) (lb/yr)

172.65

172.65

Post-Development Load (TP) (lb/yr)

172.62

Post-Development Load (TP) (lb/yr)

0.00

<sup>1</sup>Adjusted Land Cover Summary reflects the pre redevelopment land cover minus the previous land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requirement for the new impervious cover to meet the new development load limit is computed in Column I.

Maximum % Reduction Required Below Pre-ReDevelopment Load

10%

TP Load Reduction Required for Redeveloped Area (lb/yr)

17.23

TP Load Reduction Required for New Impervious Area (lb/yr)

0.00

Total Load Reduction Required (lb/yr)

17.23

Pre-Development Load (TN) (lb/yr)

1235.12

Post-Development Load (TN) (lb/yr)

1234.88



## **Bluebird Park Storm water Wetland**

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
APPLICATION FOR STORMWATER LOCAL ASSISTANCE FUND (SLAF)  
STORMWATER CAPITAL PROJECTS

**SECTION A - ORGANIZATIONAL DATA**

Name of Applicant: City of Norfolk

Applicant Address: 2233 McKann Ave  
Norfolk, VA 23509

Contact Person: Justin Shafer

Phone: 757-823-4048 Email: justin.shafer@norfolk.gov

Name of Engineer: Kimley-Horn and Associates, Inc

Engineer Address: 4500 Main St  
Suite 500  
Virginia Beach, VA 23455

Contact Person: Karl Mertig

Phone: 757-355-6671 Email: Karl.Mertig@kimley-horn.com

**SECTION B - PROPOSED FUNDING**  
**PROJECT FUNDING**

a) Amount of SLAF Grant Funds Requested

\$84500.00

	Source of Match Funds	Amount	CHECK BOX IF COMMITTED
1	Storm Water CIP	159,186	✓
2			
3			

b) Total Other Funding Available (1 + 2 + 3 ...)\*\*

159,186

c) Total Project Cost (a + b)

243,686

\*SLAF Grants provide up to 50% of project costs. Applicant must identify anticipated source(s) and amount(s) of match funds.

\*\*This amount must be at least equal to the amount of Grant Funds being requested

**SECTION C - WATER QUALITY DATA**

Location of Project Latitude 36.8733 Longitude -76.3055

(Latitude and Longitude of project is a required entry on this application. The points should be the nearest approximation of the center of your project. Please identify them in decimal degrees.)

Name of Stream / Waterbody impacted by stormwater runoff being addressed by the project

Elizabeth River

River Basin for Receiving Stream / Waterbody

James River



## SECTION D -BRIEF PROJECT DESCRIPTION AND STATEMENT OF NEED

Please include a description of project including: type of project (e.g. extended detention pond retrofit), size of area treated (acres), TMDL or impaired water the project addresses, if the project is relevant to a TMDL Implementation Plan, and other relevant information pertaining to the project. Describe the need for the proposed project. Needs should be in areas of restoring, protecting or preventing pollution in State waters.  
(attach additional pages if necessary)

The Bluebird Park project includes construction of a stormwater wetland on upland turf open space, retrofit of two existing basins, and stabilization of an eroded ditch. The area, outfalling through the ditch, serves a 14.67 acre watershed consisting of residential and institutional development. The proposed project will improve functionality of existing ponds by planting establishing wetland plantings. A DEQ Level I Stormwater Wetland will be constructed, including several deep pools, wetland plantings, and buffers between the feature and the surrounding park. The downstream channel will be stabilized, banks re-established, and the improved feature incorporated into the stormwater wetland. An increase of 12.7 lbs/yr P removal will be gained.

The BMP drains to the main channel of the Elizabeth River. The 2012 DEQ 303d list identifies these receiving waters as impaired for dissolved oxygen, PCB in fish tissue, and estuarine bioassessment. The Chesapeake Bay TMDL addresses impairment of the entire watershed for phosphorous, nitrogen, and sediment. Proposed improvements to this BMP will provide improved pollutant removal efficiency, which will assist in meeting the Bay TMDL and local impairments.

Design of the BMP is complete and will be in Site Plan Review at the time of this submission, with construction scheduled for this fiscal year. Funds are requested to allow a more rapid construction schedule of this and other currently planned projects, and to free funding for further proposed water quality projects.

## SECTION E - POLLUTION REDUCTION

The calculated Total Pounds (Per Year) of Total Phosphorous reduced from stormwater as a result of this project

= 12.7 pounds per year

The established methodology for calculating the TP reduction is outlined in Attachment A of the SLAF Guidelines. To verify calculations for pollution reduction, the following information is required with the application:

- 1) Print out the Site Data tab of the Virginia Runoff Reduction Method Spreadsheet showing the data entered and resultant TP load. Supporting documentation with rationale for parameter selection must be provided to demonstrate that the parameter estimates are valid for the project.
- 2) Provide Text to indicate which pollution reduction calculation methodology was selected, why it is appropriate for the project, the calculated phosphorus load reduction, any assumptions with supporting documentation, and parameters selected with rationale for selection (must be provided to demonstrate that estimates are valid for the project). All supporting calculations must be provided.
- 3) If the project is a retrofit of an existing BMP provide photographs showing the BMP before the upgrade. Provide text to describe the upgrade / enhancement and the incremental phosphorus load reduction achieved utilizing the SLAF guideline references, with supporting documentation. Rationale and calculated estimates BMP's current (former) efficiency must be provided.

## SECTION F - READINESS-TO-PROCEED

### PROJECT STATUS

	Yes	No	N/A
Is the project included in Stormwater or Watershed Management Plan? (If Yes, attach documentation to application)	✓		
Is the project identified in current year Capital Improvement Plan or Annual Budget? (If Yes, attach documentation to application)	✓		
Is acquisition of land necessary to complete project?		✓	
Has the land necessary for the project already been acquired? (If Yes, attach documentation to application)			✓
Has an engineer been selected for project design? (If Yes, provide name)	✓		

### ANTICIPATED SCHEDULE

	<i>Schedule Item Description</i>	<i>Date</i>
a.	Notice to Proceed on Design	October 14, 2013
b.	Completion of Plans/Specifications	October 17, 2014
c.	Plans and Specs Approved	November 24, 2014
d.	Advertise for Bids	December 7, 2014
e.	Bid Opening	December 30, 2014
f.	Award Contracts	March 30, 2015
g.	Estimated Construction Time (expressed in months)	6

## SECTION G -PROJECT BUDGET INFORMATION

Legal / Administration	\$0.00
Land, Right-of-Way	\$0.00
Architectural Engineering Basic Fees	\$74686.00
Project Inspection Fees	\$0.00
Other (Explain)	\$0.00
Stormwater BMP Construction	152,100
Contingencies	\$16900.00
<b>TOTAL*</b>	<b>243,686 *</b>

\*This amount should be the exact same as the amount in Item c) Total Project Cost, Section B, Page 1.



## SECTION H

	Yes	No	N/A
Has applicant adopted a dedicated source of revenue to implement a stormwater control program in accordance with §15.2-2114? (If so, attach documentation)	✓		
Is the applicant subject to an MS4 discharge permit in accordance with §62.1-44.5?	✓		
Does the project address requirements of your MS4 permit? If yes, explain:	✓		
<p>The City of Norfolk MS4 permit calls for the City to develop, implement and refine pollution prevention measures, management or removal techniques, and other appropriate means to control the quality and quantity of storm water discharged from the MS4. The permit further calls for a program to utilize structural and source control measures to reduce pollutants from commercial and residential areas. The project described above will provide both quality and quantity improvements to water discharged through the City's MS4, meeting a requirement of the permit.</p>			

Name of MS4 Permittee if different from Applicant

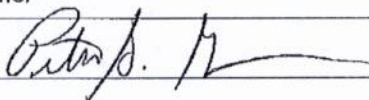
## SECTION I - ASSURANCES AND CERTIFICATIONS

The undersigned representative of the applicant certifies that the information contained herein and the attached statements and exhibits are true, correct and complete to the best of their knowledge and belief. The undersigned also agrees to clarify or supplement information pertaining to this application upon request.

Name: Pete Garner

Title: Operations Engineering Manager

Signature: \_\_\_\_\_

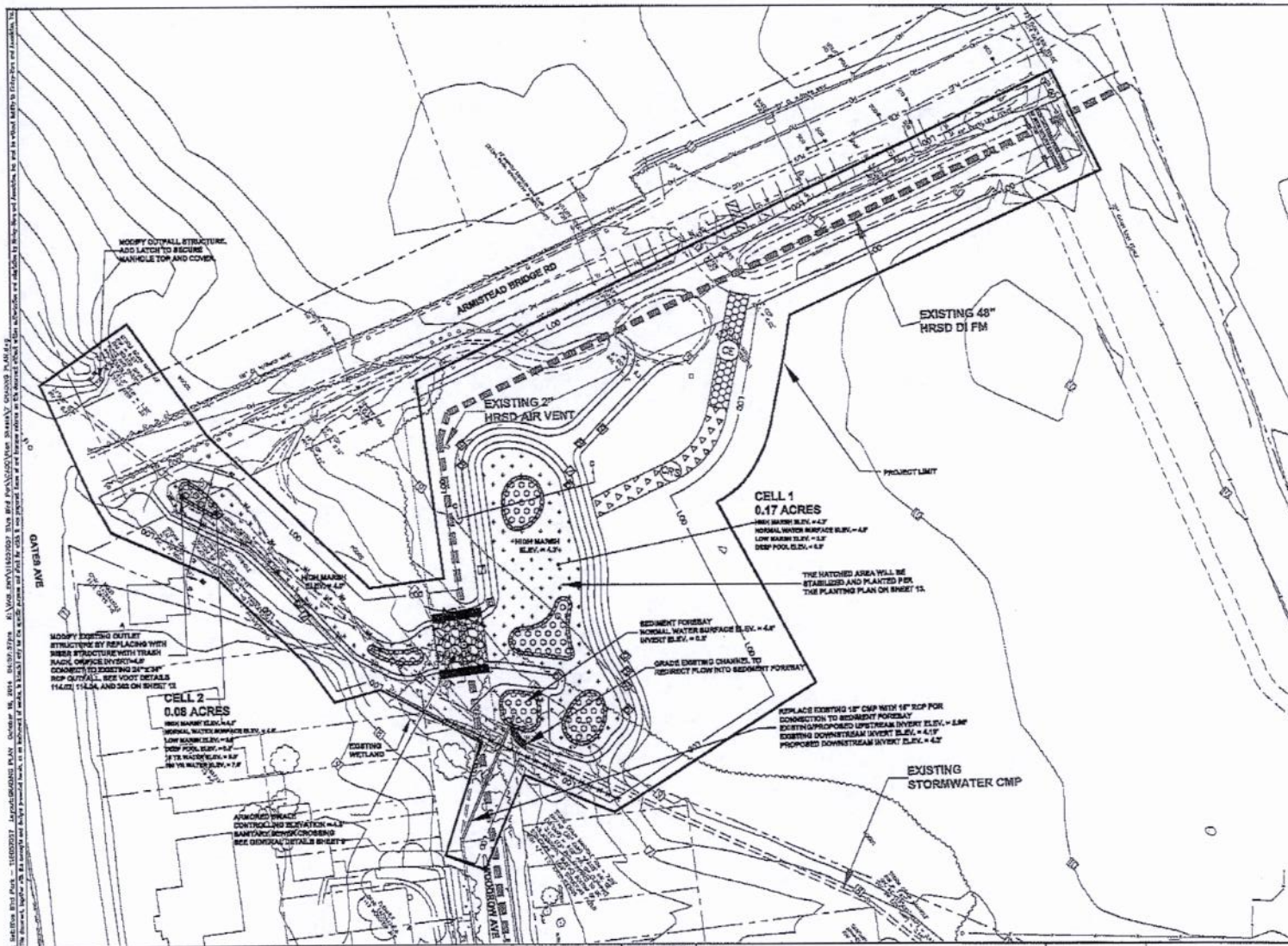


Date: October 21, 2014

## SECTION J - ATTACHMENTS

Include all required attachments appropriate for your application. The following is a list of potential attachments:

- 1) Documentation supporting the Pollution Reduction methodology, calculations, text, etc. as described in Section E.
- 2) Excerpt from Stormwater or Watershed Management Plan. (Section F)
- 3) Excerpt from Capital Improvement Plan or Annual Budget. (Section F)
- 4) Documentation of land acquisition. (Section F)
- 5) Documentation of Dedicated Revenue Source for Stormwater Management Program. (Section H)



**FLOOD RISK**

FLOOD ELEVATIONS WITHIN THE PROJECT SITE CAN POTENTIALLY REACH ELEVATION 7.6' (NAVD88) DURING A 100-YEAR STORM EVENT AND CAN REACH APPROXIMATELY ELEVATION 5.5' (NAVD88) IN CELL 2 DURING A 10-YEAR STORM EVENT.

**PLANTING PLAN LEGEND**

HIGH MARSH WETLAND  
 LOW MARSH WETLAND  
 DEEP POOL

**GENERAL NOTES**

SEE SHEET 13 FOR DETAILED PLANTING PLAN

**LEGEND**

PROJECT BOUNDARY LINE  
 GRADING CONTOURS  
 WOODEN BARRIER  
 CONCRETE SWALE  
 ARMORED SWALE  
 HIGH MARSH WETLAND  
 LOW MARSH WETLAND  
 DEEP POOL  
 GRADING TO REDIRECT FLOW  
 TEMPORARY CONSTRUCTION ENTRANCE  
 TEMPORARY HAUL ROAD  
 COIR FIBER MATTING

**WETLAND AREA SUMMARY**

PRE-RETROFIT WETLAND AREA :  
 0.25 AC PFD  
 POST-RETROFIT WETLAND AREA:  
 0.25 AC PFD



No.	REVISIONS	DATE	BY

**Kimley»Horn**

© 2014 KIMLEY-HORN AND ASSOCIATES, INC.  
 4300 MAIN STREET, SUITE 500, VIRGINIA BEACH, VA 23462  
 PHONE: 757-213-8800 FAX: 757-213-8801  
 WWW.KIMLEY-HORN.COM

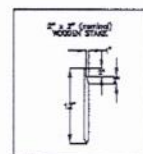
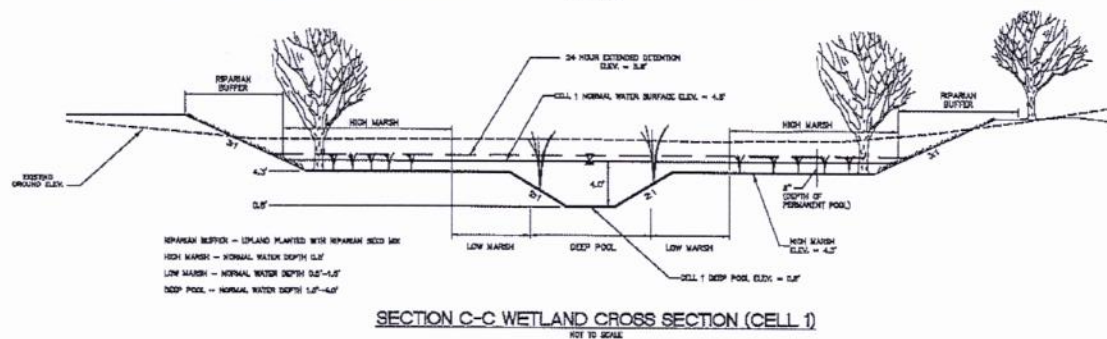
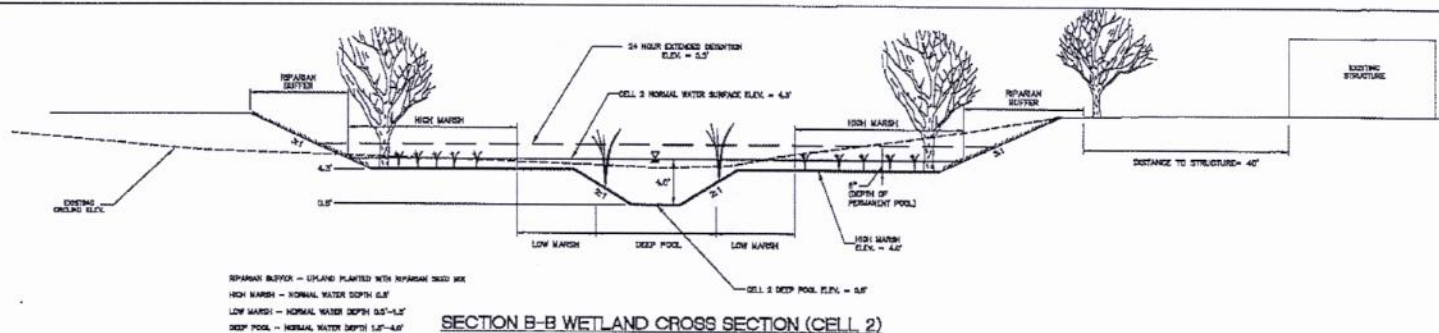
2014 PROJECT  
 116057057  
 DATE  
 OCTOBER 16, 2014  
 SCALE AS SHOWN  
 DESIGNED BY RAN  
 DRAWN BY KDC  
 CHECKED BY CMP

**BLUE BIRD PARK STORMWATER  
 WETLAND**  
 PREPARED FOR  
**CITY OF NORFOLK**  
 VA

**GRADING PLAN**

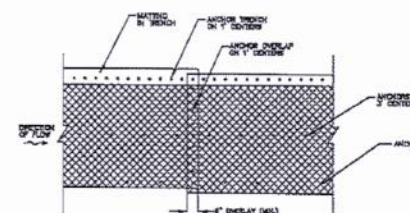
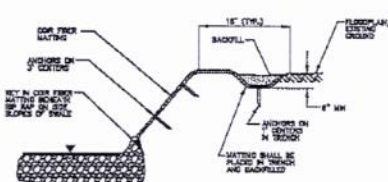
SHEET NUMBER  
**7**





**NOTES**

- \* IN AREAS TO BE MATTED, ALL SEEDING, SOIL ADJUSTMENTS, AND SOIL PREPARATION MUST BE COMPLETED IN ACCORDANCE WITH PROJECT SPECIFICATIONS PRIOR TO PLACEMENT OF DARK FIBER MATTING.
- \* CORNTHANON BASED STAKES MAY BE USED IN PLACE WOOD STAKES IF APPROVED BY THE OWNER AND DESIGNER PRIOR TO INSTALLATION.

[illegible]

**Kimley»Horn**

© 2014 KIMLEY-HORN AND ASSOCIATES, INC.  
4800 MAIN STREET, SUITE 300, VIRGINIA BEACH, VA 23462  
PHONE: 757-213-8800 FAX: 757-213-8801  
WWW.KIMLEY-HORN.COM

IDA PROJECT 118057037	BL
DATE OCTOBER 18, 2014	
SCALE AS SHOWN	
DESIGNED BY RAW	
DRAWN BY KDK	
CHECKED BY DMP	NORFOLK

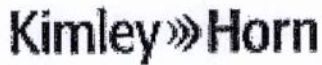
BLUE BIRD PARK STORMWATER  
WETLAND  
PREPARED FOR  
CITY OF NORFOLK

1

## GENERAL DETAILS

SHEET NUMBER

8



## CONSTRUCTED WETLAND

### Project Information

Project Name: Blue Bird Park Stormwater Wetlands  
KHA Project #: 116057057  
Designed by: RAW Date: 10/9/2014

### Site Information

Sub Area Location: Blue Bird Park  
Drainage Area (DA) = 14.68 ac  
Forest/Open Space Area = 3.08 ac  
Managed Turf Area = 6.12 ac  
Impervious Area = 5.48 ac  
Percent Impervious (I) = 37.3 %

### Required Storage Volume

Design Storm = 1 inch  
Site Rv = 0.46 in/in  
Storage Volume Required (Tv) = 24,504 cf  
Storage Volume Provided (Tv) = 22,937 cf

### Extended Detention

Maximum Extended Detention (ED) = 11,469 cf (ED storage can be up to 12 inches in depth)  
Extended Detention Provided (ED) = 10,835 cf (ED storage can be up to 12 inches in depth)

High Marsh Surface Area Sufficient (yes/no) ?	<u>YES</u>	(	9,315	≥	9,148	) sf
Is ED Volume Acceptable (yes/no) ?	<u>YES</u>	(	10,835	≤	11,469	) cf
Is Volume Sufficient (yes/no) ?	<u>NO</u>	(	22,937	≥	24,504	) cf

Phosphorus Removal  
Potential Removal (Tv fully sized) 7.94 lb./yr.  
Design Removal (Tv 93.6%) 7.43 lb./yr.



# Virginia Runoff Reduction Method New Development Worksheet - v2.8 - June 2014

To be used w/ DRAFT 2013 BMP Standards and Specifications

## Site Data

Project Name: Blue Bird Park Constructed Wetland

Date: October 2014

	data input cells
	calculation cells
	constant values

## 1. Post-Development Project & Land Cover Information

### Constants

Annual Rainfall (inches)	46				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26		Nitrogen EMC (mg/L)	1.86	
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				

### Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	2.17	0.91	3.08
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	5.73	0.39	6.12
Impervious Cover (acres)	0.00	0.00	4.26	1.21	5.48
				Total	14.67

### Rv Coefficients

	A soils	B Soils	C Soils	D Soils	
Forest/Open Space	0.02	0.03	0.04	0.05	
Managed Turf	0.15	0.20	0.22	0.25	
Impervious Cover	0.95	0.95	0.95	0.95	

### Land Cover Summary

Forest/Open Space Cover (acres)	3.08				
Weighted Rv(forest)	0.04				
% Forest	21%				
Managed Turf Cover (acres)	6.12				
Weighted Rv(turf)	0.22				
% Managed Turf	42%				
Impervious Cover (acres)	5.48				
Rv(Impervious)	0.95				
% Impervious	37%				
Total Site Area (acres)	14.67				
Site Rv	0.46				
Post-Development Treatment Volume (acre-ft)	0.56				
Post-Development Treatment Volume (cubic feet)	24,293				
Post Development Load (TP) (lb/yr)	16.21	Post Development Load (TN) (lb/yr)	115.99		
Total Load (TP) Reduction Required (lb/yr)	10.20				





**KIMLEY-HORN & ASSOCIATES, INC.**

4500 Main Street, Suite 500  
Virginia Beach, VA 23462  
TEL: (757) 213-8800 FAX: (757) 213-8801

**OPINION OF PROBABLE CONSTRUCTION COST  
BLUE BIRD PARK STORMWATER WETLANDS  
NORFOLK, VIRGINIA**

PROJECT: Blue Bird Park Stormwater Wetlands  
CLIENT: City of Norfolk  
DATE: 10/10/2014

JOB NUMBER: 116057057  
PREPARED BY: Rachel Watts  
REVIEWED BY: Daren Pelt

	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT COST	TOTAL COST
<b>GENERAL</b>					<b>\$15,360</b>
	MOBILIZATION AND SITE PREPARATION	10%	Percent of Subtotal	\$15,360	\$15,360
<b>CONSTRUCTION</b>					<b>\$108,250</b>
	CONSTRUCTION LAYOUT AND AS-BUILT SURVEY	1	LS	\$7,000	\$7,000
	CLEARING AND GRUBBING	1	AC	\$5,000	\$2,500
	GRADING (CUT, HAULED OFF-SITE)	2,300	CY	\$25	\$57,500
	GRADING (FILL, MOVED ON-SITE)	200	CY	\$15	\$3,000
	24" RCP	80	LF	\$120	\$9,600
	PUMP AROUND OPERATION	1	LS	\$8,000	\$8,000
	ARMORED SWALE BETWEEN CELL 1 AND CELL 2	1	EA	\$7,500	\$7,500
	STRUCTURE STONE	20	TON	\$45	\$900
	MODIFY EXISTING OUTFALL COVER (WEST OF ARMISTEAD BR. RD.)	1	EA	\$750	\$750
	DEMOLITION OF EXISTING OUTLET STRUCTURE	1	EA	\$1,500	\$1,500
	NEW OUTFALL STRUCTURE	1	EA	\$8,000	\$8,000
<b>EROSION CONTROL</b>					<b>\$21,400</b>
	TEMPORARY CONSTRUCTION ENTRANCE	1	EA	\$2,500	\$2,500
	TEMPORARY HAUL ROAD	1	EA	\$2,000	\$2,000
	TEMPORARY ROCK SILT CHECK DAM	1	EA	\$3,000	\$3,000
	TEMPORARY INLET PROTECTION	2.00	EA	\$250	\$500
	TEMPORARY SEEDING	1.00	AC	\$1,000	\$1,000
	COIR FIBER MATTING	400	SF	\$4.50	\$1,800
	SILT/TREE PROTECTION FENCE	2,000	LF	\$5.00	\$10,000
<b>LANDSCAPING &amp; PLANTING</b>					<b>\$25,950</b>
	TOPSOIL (3" ACROSS HIGH MARCH, LOW MARSH, AND RIPARIAN AREAS)	230	CY	\$30	\$6,900
	PERMANENT SEEDING	1.30	AC	\$1,000	\$1,300
	HERBACEOUS PLUGS	750	EA	\$4.00	\$3,000
	CONTAINERIZED 1 GALLON SHRUBS	200	EA	\$25	\$5,000
	CONTAINERIZED TREES	85	EA	\$150	\$9,750
<b>TOTAL CONSTRUCTION COST</b>					<b>\$169,000</b>

**Notes:**

This cost opinion is based solely on Draft Construction Drawings prepared by Kimley-Horn and Associates, Inc.

The Engineer has no control over the cost of labor, materials, or equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs, as provided here, are made on the basis of the Engineer's experience and qualifications and represent the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from opinions of probable cost prepared for the Owner.

## Central Business Park Level II Wet Pond





DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
APPLICATION FOR STORMWATER LOCAL ASSISTANCE FUND (SLAF)  
STORMWATER CAPITAL PROJECTS

**SECTION A - ORGANIZATIONAL DATA**

Name of Applicant:	City of Norfolk		
Applicant Address:	2233 McKann Ave Norfolk, VA 23509		
Contact Person:	Justin Shafer		
Phone:	757-823-4048	Email:	justin.shafer@norfolk.gov
Name of Engineer:	Kimley-Horn and Associates, Inc		
Engineer Address:	4500 Main St Suite 500 Virginia Beach, VA 23455		
Contact Person:	Karl Mertig		
Phone:	757-355-6671	Email:	Karl.Mertig@kimley-horn.com

**SECTION B - PROPOSED FUNDING**

**PROJECT FUNDING**

a) Amount of SLAF Grant Funds Requested

\$82000.00

	Source of Match Funds	Amount	CHECK BOX IF COMMITTED
1	Storm Water CIP	\$82000.00	✓
2			
3			

b) Total Other Funding Available (1 + 2 + 3 ...)\*\*

\$82000.00

c) Total Project Cost (a + b)

164,000

\*SLAF Grants provide up to 50% of project costs. Applicant must identify anticipated source(s) and amount(s) of match funds.

\*\*This amount must be at least equal to the amount of Grant Funds being requested.

**SECTION C - WATER QUALITY DATA**

Location of Project	Latitude	36.9086	Longitude	-76.2510
(Latitude and Longitude of project is a required entry on this application. The points should be the nearest approximation of the center of your project. Please identify them in decimal degrees.)				
Name of Stream / Waterbody impacted by stormwater runoff being addressed by the project				
Lafayette River, Elizabeth River				
River Basin for Receiving Stream / Waterbody				
James River				

## SECTION D -BRIEF PROJECT DESCRIPTION AND STATEMENT OF NEED

Please include a description of project including: type of project (e.g. extended detention pond retrofit), size of area treated (acres), TMDL or impaired water the project addresses, if the project is relevant to a TMDL Implementation Plan, and other relevant information pertaining to the project. Describe the need for the proposed project. Needs should be in areas of restoring, protecting or preventing pollution in State waters.  
(attach additional pages if necessary)

Central Business Park Pond is a 1.2 acre retention basin draining a 22.4 acre watershed consisting of mixed commercial, industrial and institutional development. The existing BMP removes 16.5 lb/yr P. The proposed retrofit will enhance the basin to a DEQ Level 2 Wet Pond by dividing it into cells using earthen berms, establishing a pre-treatment forebay, improving aeration, and adding 0.10 acres of wetlands. An increase of 7.4 lbs/yr P removal will be gained.

The BMP drains to the Lafayette River and then to the main channel of the Elizabeth River. The 2012 DEQ 303d list identifies these receiving waters as impaired for dissolved oxygen, PCB in fish tissue, Enterococcus, and estuarine bioassessment. The Chesapeake Bay TMDL addresses impairment of the entire watershed for phosphorous, nitrogen, and sediment. Proposed improvements to this BMP will provide improved pollutant removal efficiency, which will assist in meeting the Bay TMDL and local impairments.

Feasibility analysis of the BMP is complete, with design anticipated to proceed in FY16 and construction in FY17. Funds are requested to allow a more rapid construction schedule of this and other currently planned projects, and to free funding for further proposed water quality projects.

## SECTION E - POLLUTION REDUCTION

The calculated Total Pounds (Per Year) of Total Phosphorous reduced from stormwater as a result of this project

= 7.4 pounds per year

The established methodology for calculating the TP reduction is outlined in Attachment A of the SLAF Guidelines. To verify calculations for pollution reduction, the following information is required with the application:

1) Print out the Site Data tab of the Virginia Runoff Reduction Method Spreadsheet showing the data entered and resultant TP load. Supporting documentation with rationale for parameter selection must be provided to demonstrate that the parameter estimates are valid for the project.

2) Provide Text to indicate which pollution reduction calculation methodology was selected, why it is appropriate for the project, the calculated phosphorus load reduction, any assumptions with supporting documentation, and parameters selected with rationale for selection (must be provided to demonstrate that estimates are valid for the project). All supporting calculations must be provided.

3) If the project is a retrofit of an existing BMP provide photographs showing the BMP before the upgrade. Provide text to describe the upgrade / enhancement and the incremental phosphorus load reduction achieved utilizing the SLAF guideline references, with supporting documentation. Rationale and calculated estimates BMP's current (former) efficiency must be provided.



**SECTION F - READINESS-TO-PROCEED  
PROJECT STATUS**

	Yes	No	N/A
Is the project included in Stormwater or Watershed Management Plan? (If Yes, attach documentation to application)	✓		
Is the project identified in current year Capital Improvement Plan or Annual Budget? (If Yes, attach documentation to application)		✓	
Is acquisition of land necessary to complete project?		✓	
Has the land necessary for the project already been acquired? (If Yes, attach documentation to application)			✓
Has an engineer been selected for project design? (If Yes, provide name)	✓		

**ANTICIPATED SCHEDULE**

	<i>Schedule Item Description</i>	<i>Date</i>
a.	Notice to Proceed on Design	July 1, 2015
b.	Completion of Plans/Specifications	January 15, 2016
c.	Plans and Specs Approved	February 27, 2016
d.	Advertise for Bids	March 6, 2016
e.	Bid Opening	March 29, 2016
f.	Award Contracts	July 1, 2016
g.	Estimated Construction Time (expressed in months)	4

**SECTION G -PROJECT BUDGET INFORMATION**

Legal / Administration	\$0.00
Land, Right-of-Way	\$0.00
Architectural Engineering Basic Fees	\$57000.00
Project Inspection Fees	\$0.00
Other (Explain)	\$0.00
Stormwater BMP Construction	\$96300.00
Contingencies	\$10700.00
<b>TOTAL*</b>	<b>164,000 *</b>

\*This amount should be the exact same as the amount in Item c) Total Project Cost, Section B, Page 1.

## SECTION H

	Yes	No	N/A
Has applicant adopted a dedicated source of revenue to implement a stormwater control program in accordance with §15.2-2114? (If so, attach documentation)	✓		
Is the applicant subject to an MS4 discharge permit in accordance with §62.1-44.5?	✓		
Does the project address requirements of your MS4 permit? If yes, explain:	✓		
<p>The City of Norfolk MS4 permit calls for the City to develop, implement and refine pollution prevention measures, management or removal techniques, and other appropriate means to control the quality and quantity of storm water discharged from the MS4. The permit further calls for a program to utilize structural and source control measures to reduce pollutants from commercial and residential areas. The project described above will provide both quality and quantity improvements to water discharged through the City's MS4, meeting a requirement of the permit.</p>			

Name of MS4 Permittee if different from Applicant

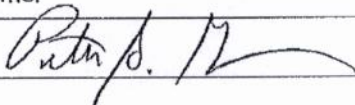
## SECTION I - ASSURANCES AND CERTIFICATIONS

The undersigned representative of the applicant certifies that the information contained herein and the attached statements and exhibits are true, correct and complete to the best of their knowledge and belief. The undersigned also agrees to clarify or supplement information pertaining to this application upon request.

Name: Pete Garner

Title: Operations Engineering Manager

Signature: \_\_\_\_\_



Date: October 21, 2014

## SECTION J - ATTACHMENTS

Include all required attachments appropriate for your application. The following is a list of potential attachments:

- 1) Documentation supporting the Pollution Reduction methodology, calculations, text, etc. as described in Section E.
- 2) Excerpt from Stormwater or Watershed Management Plan. (Section F)
- 3) Excerpt from Capital Improvement Plan or Annual Budget. (Section F)
- 4) Documentation of land acquisition. (Section F)
- 5) Documentation of Dedicated Revenue Source for Stormwater Management Program. (Section H)



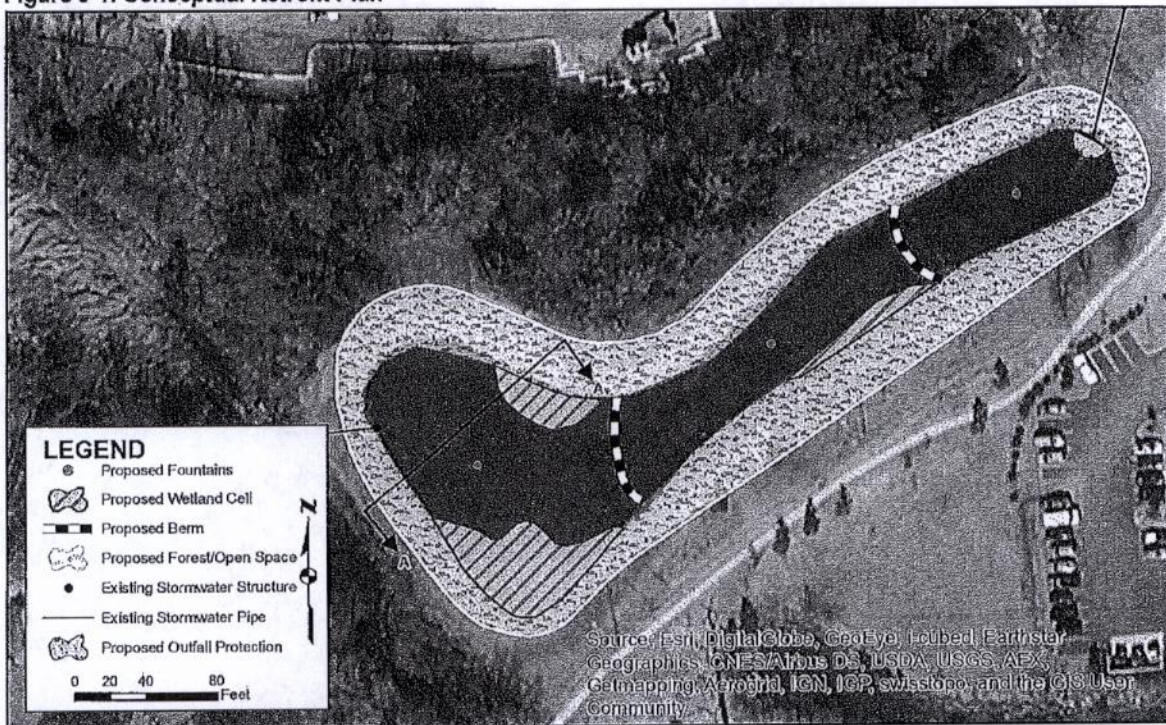
## EXECUTIVE SUMMARY

The City of Norfolk, Virginia requested that Kimley-Horn and Associates, Inc. (Kimley-Horn) conduct a feasibility study to evaluate water quality improvement opportunities and potential generation of nutrient credits for the Central Business Park (the Site) in Norfolk, Virginia. The primary goal of the proposed improvements will be to reduce nutrient loading in the Lafayette River and thus, the Chesapeake Bay and provide an opportunity for the City to obtain nutrient reduction credits. Secondary benefits will include the improvement of natural habitat through the creation and enhancement of wetlands.

The Central Business Park Pond is located adjacent to the western terminus of Denison Avenue in Norfolk, Virginia. The Pond is approximately 0.67 acres in size and has an average depth of 6 to 18 inches below normal water surface elevation with evidence of significant sedimentation. The Central Business Park Pond receives water from 22.4 acres through a series of stormwater inlets and pipes and outfalls along the southwestern pond boundary into the upstream limits of Wayne Creek. Wayne Creek is a tributary of the Lafayette River, the Elizabeth River (HUC 020802080206) and the Chesapeake Bay. Based on the existing water quality treatment volume, it is estimated that the Pond currently functions with a phosphorus removal efficiency of approximately 31%.

After completing Site reconnaissance, document review, and hydrologic analysis Kimley-Horn determined that the most effective retrofit opportunity is enhancement of the pond to a DEQ Level 2 Wet Pond as depicted in Figure 3-1, Conceptual Retrofit Plan. The retrofit would consist primarily of dredging the pond to provide adequate treatment volume, dividing the pond into multiple cells including a pretreatment forebay, the addition of nearly 0.10 acres of wetlands, pond aeration, and conversion of the pond perimeter from managed turf to forest/open space.

Figure 3-1: Conceptual Retrofit Plan





The water quality calculations for analysis of the proposed retrofit utilized the Virginia Runoff Reduction Method and are included as Appendix D. The total pollutant reduction accounts for both the pond enhancement to a Level 2 Wet Pond and the conversion of the pond perimeter to forest/open space. In total, the proposed retrofit could potentially reduce annual phosphorus loading by up to 13.5 pounds and could reduce annual nitrogen loading by up to 47.2 pounds. It is also estimated that 2,821 pounds of total suspended solids/sediments could be reduced per year with proper maintenance of the pond.

A preliminary Opinion of Probable Construction Cost (OPCC) was prepared for the retrofit of the Central Business Park pond. The OPCC includes major aspects of the retrofit design as described above. The total construction cost per this OPCC is approximately \$110,000. A copy of the OPCC is included as Appendix C. Table 4-3 summarizes the nutrient removal rates and cost efficiency of the proposed retrofit.

Table 4-3: Nutrient Removal Efficiency			
	Nutrient Removal	Cost Efficiency / Year	Cost / 20-Year Maintenance Cycle
Phosphorus	13.5 lbs./yr.	\$ 8,100 /lbs./yr.	\$ 405 /lbs./yr.
Nitrogen	47.2 lbs./yr.	\$ 2,300 /lbs./yr.	\$ 115 /lbs./yr.
Total Suspended Solids	2,821 lbs./yr.	\$40 /lbs./yr.	\$ 2 /lbs./yr.

Kimley-Horn recommends that coordination with the USACE and DEQ be continued to complete confirmation of coverage under a USACE Nationwide Permit 27. Kimley-Horn also recommends hydraulic analysis of the proposed retrofit be completed to confirm the capacity of the pond for the 100-year storm event. If this analysis determines that the pond does not have adequate capacity, the design of a spillway is recommended as part of the retrofit. Additionally, Kimley-Horn recommends a full geotechnical investigation to determine the composition of the in-situ soils and their suitability for re-use for cell division and wetland cell creation.

This retrofit has an anticipated phosphorus removal of 13.5 pounds, an OPCC of \$110,000, and a cost efficiency of \$8,100 per pound of phosphorus per year. This project will assist the City in meeting its target TMDL goals as well as provide improvement of natural habitat through the creation of wetlands and forest/open space.



Figure 2-2: Watershed Delineation Map

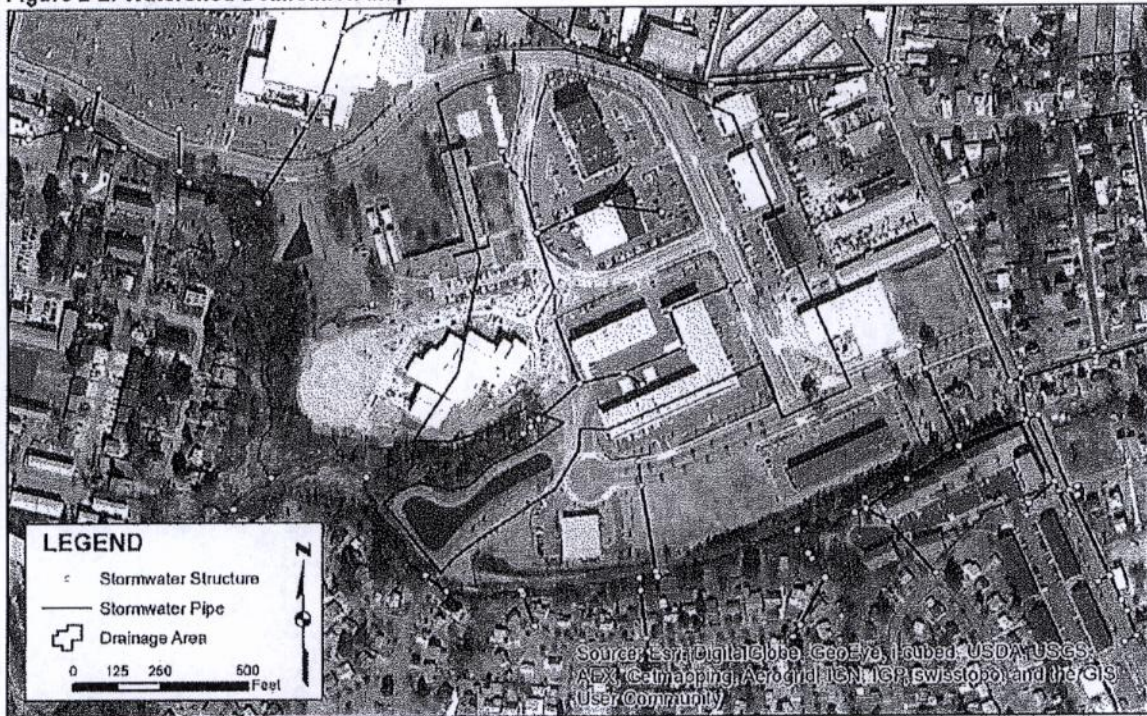
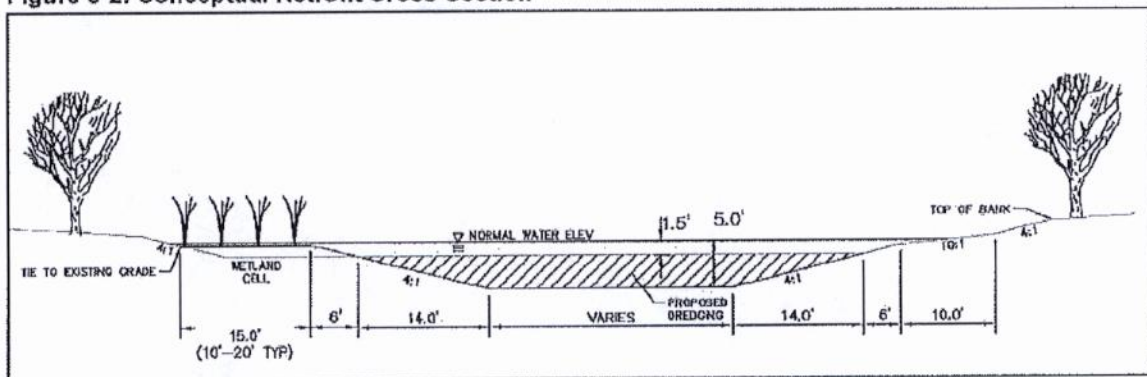


Figure 3-2: Conceptual Retrofit Cross Section



# Kimley»Horn

Project: Central Business Park

Project #: 113057069

Date: 10/21/2014

Locality: Norfolk (City)

LAND USE TYPE	C	CN
IMPERVIOUS	0.95	98
MANAGED TURF	0.25	80
FOREST/ OPEN SPACE	0.05	77

Drainage Area Summary							
Site Name	Drainage Area	Impervious	Managed Turf	Forest/Open Space	C	Tv Provided	Tv Required
Pre-Retrofit	22.42 ac	15.35 ac	6.87 ac	0.20 ac	0.73	0.9 ac-ft	1.4 ac-ft
Post-Retrofit	22.42 ac	15.35 ac	6.33 ac	0.74 ac	0.72	2.1 ac-ft	2.0 ac-ft

Pond Retrofit Summary			
Site Name	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pre-Retrofit: Level 1, 31% Efficient	12.0 lbs/yr	38.7 lbs/yr	2,247 lbs/yr
Post-Retrofit: Level 2, 65% Efficient	25.3 lbs/yr	84.2 lbs/yr	4,932 lbs/yr
Net Benefit	13.3 lbs/yr	45.6 lbs/yr	2,686 lbs/yr

Nutrient Removal Summary			
Improvement	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pond Retrofit	13.3 lbs/yr	45.6 lbs/yr	2,686 lbs/yr
Land Conversion	0.2 lbs/yr	1.6 lbs/yr	136 lbs/yr
Net Benefit	13.5 lbs/yr	47.2 lbs/yr	2,822 lbs/yr

Pre-Retrofit Water Quality Volume					
	Elevation (feet)	Area (feet)	Inc. Vol.	Total Volume	Total Volume
Normal Water	5.0	29,240	0 cf	0 cu-ft	0.00 ac-ft
	4.0	25,995	27,617 cf	27,617 cu-ft	0.63 ac-ft
	3.5	24,394	12,597 cf	40,214 cu-ft	0.92 ac-ft

Post-Retrofit Water Quality Volume					
	Elevation (feet)	Area (feet)	Inc. Vol.	Total Volume	Total Volume
Normal Water	5.0	29,240	0 cf	0 cu-ft	0 ac-ft
	4.0	25,995	27,617 cf	27,617 cu-ft	0.63 ac-ft
	3.0	22,807	24,401 cf	52,018 cu-ft	1.19 ac-ft
	2.0	19,678	21,243 cf	73,261 cu-ft	1.68 ac-ft
	1.0	16,608	18,143 cf	91,404 cu-ft	2.10 ac-ft



Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014

To be used w/ DRAFT 2013 BMP Standards and Specifications

Site Data

Project Name: Central Business Park Pond

Date: October 2014

date input cells  
calculation cells  
constant values

Post-ReDevelopment Project & Land Cover Information

Total Disturbed Acreage

1.50

Constants

Annual Rainfall (inches)	46				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.26		Nitrogen EMC (mg/L)	1.86	
Target Phosphorus Target Load (lb/acre/yr)	0.41				
Pj	0.90				

Pre-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.15	0.05	0.20
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	5.30	0.97	6.87
Impervious Cover (acres)	0.00	0.00	12.17	3.18	15.35
			Total		22.42

Post-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.79	0.05	0.84
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	5.36	0.97	6.33
Impervious Cover (acres)	0.00	0.00	12.17	3.18	15.35
			Total		22.62

Area Check

Okay Okay Check Areas Okay

Rv Coefficients

	A soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

Land Cover Summary

Listed

Adjusted<sup>1</sup>

Land Cover Summary

Land Cover Summary

Pre-ReDevelopment			Post-ReDevelopment		Post-ReDevelopment New Impervious
Forest/Open Space Cover (acres)	0.20	0.20	Forest/Open Space Cover (acres)	0.84	
Composite Rv(forest)	0.04	0.04	Composite Rv(forest)	0.04	
% Forest	1%	1%	% Forest	4%	
Managed Turf Cover (acres)	6.87	6.87	Managed Turf Cover (acres)	6.33	
Composite Rv(turf)	0.22	0.22	Composite Rv(turf)	0.22	
% Managed Turf	31%	31%	% Managed Turf	28%	
Impervious Cover (acres)	15.35	15.35	ReDev. Impervious Cover (acres)	15.35	New Impervious Cover (acres)
Rv(imperious)	0.95	0.95	Rv(imperious)	0.95	0.95
% Impervious	68%	68%	% Impervious	68%	% Impervious
Total Site Area (acres)	22.42	22.42	Total ReDev. Site Area (acres)	22.52	Total New Dev. Site Area (acres)
Site Rv	0.72	0.72	ReDev. Site Rv	0.71	New Dev. Site Rv
					0.95

Pre-Development Treatment Volume (acre-ft)	1.3443	1.3443	Post-Development Treatment Volume (acre-ft)	1.3365	Post-Development Treatment Volume (acre-ft)
					0.0001
Pre-Development Treatment Volume (cubic feet)	58,558	58,557	Post-Development Treatment Volume (cubic feet)	58,220	Post-Development Treatment Volume (cubic feet)
					3
Pre-Development Load (TP) (lb/yr)	39.09	39.08	Post-Development Load (TP) (lb/yr)	38.86	Post-Development Load (TP) (lb/yr)
					0.00

<sup>1</sup>Adjusted Land Cover Summary reflects the pre redevelopment land cover minus the previous land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requirement for the new impervious cover to meet the new development load limit is computed in Column I.

Maximum % Reduction Required Below Pre-ReDevelopment Load

20%

TP Load Reduction Required for Redeveloped Area (lb/yr)

7.59

TP Load Reduction Required for New Impervious Area (lb/yr)

0.00

Total Load Reduction Required (lb/yr)

7.59

Pre-Development Load (TN) (lb/yr)

279.61

Post-Development Load (TN) (lb/yr)

278.01



<b>Site Results</b>					
	<b>D.A. A</b>	<b>D.A. B</b>	<b>D.A. C</b>	<b>D.A. D</b>	<b>D.A. E</b>
IMPERVIOUS COVER	15.35	0.00	0.00	0.00	0.00
IMPERVIOUS COVER TREATED	15.35	0.00	0.00	0.00	0.00
TURF AREA	6.87	1.00	0.00	0.00	0.00
TURF AREA TREATED	6.87	1.00	0.00	0.00	0.00
AREA CHECK	OK.	OK.	OK.	OK.	OK.
<b>Phosphorous</b>					
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	3.91				
RUNOFF REDUCTION (cf)	73				
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	17.67				
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	21.41				
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 13.8 LB/YEAR!!				
<b>Nitrogen (for information purposes)</b>					
RUNOFF REDUCTION (cf)	73				
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	56.92				
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	222.71				



Site Results					
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E
IMPERVIOUS COVER	15:35	0:00	0:00	0:00	0:00
IMPERVIOUS COVER TREATED	15:35	0:00	0:00	0:00	0:00
TURF AREA	6:33	1:00	0:00	0:00	0:00
TURF AREA TREATED	6:33	1:00	0:00	0:00	0:00
AREA CHECK	OK.	OK.	OK.	OK.	OK.
Phosphorous					
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	7.59				
RUNOFF REDUCTION (cf)	73				
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	25:29				
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	13:57				
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 17.7 LB/YEAR!!				
Nitrogen (for information purposes)					
RUNOFF REDUCTION (cf)	73				
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	84:22				
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	193:79				

## Dune Street Wet Swale





DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
APPLICATION FOR STORMWATER LOCAL ASSISTANCE FUND (SLAF)  
STORMWATER CAPITAL PROJECTS

**SECTION A - ORGANIZATIONAL DATA**

Name of Applicant:

Applicant Address:

Contact Person:

Phone:  Email:

Name of Engineer:

Engineer Address:

Contact Person:

Phone:  Email:

**SECTION B - PROPOSED FUNDING**

**PROJECT FUNDING**

a) Amount of SLAF Grant Funds Requested

	Source of Match Funds	Amount	CHECK BOX IF COMMITTED
1	Storm Water CIP	\$67000.00	✓
2			
3			

b) Total Other Funding Available (1 + 2 + 3 ...)

c) Total Project Cost (a + b)

\*SLAF Grants provide up to 50% of project costs. Applicant must identify anticipated source(s) and amount(s) of match funds.

\*\*This amount must be at least equal to the amount of Grant Funds being requested

**SECTION C - WATER QUALITY DATA**

Location of Project Latitude  Longitude

(Latitude and Longitude of project is a required entry on this application. The points should be the nearest approximation of the center of your project. Please identify them in decimal degrees.)

Name of Stream / Waterbody impacted by stormwater runoff being addressed by the project

River Basin for Receiving Stream / Waterbody

## SECTION D -BRIEF PROJECT DESCRIPTION AND STATEMENT OF NEED

Please include a description of project including: type of project (e.g. extended detention pond retrofit), size of area treated (acres), TMDL or impaired water the project addresses, if the project is relevant to a TMDL Implementation Plan, and other relevant information pertaining to the project. Describe the need for the proposed project. Needs should be in areas of restoring, protecting or preventing pollution in State waters.  
(attach additional pages if necessary)

The Dune Street Park project focuses on a shallow ditch which drains a 3.15 acre watershed of the park and surrounding neighborhood. The proposed retrofit will enhance the ditch to a DEQ Level 2 Wet Swale by expanding the width of the feature, adding a forebay, and creating adjacent wetland cells. A diversion structure on an adjacent storm water line would allow first flush treatment of a larger 35.3 acre watershed with similar characteristics to the already treated area. Though the swale will remain undersized for the drainage area it services, a net increase of 6.1 lbs/yr P removal will be gained.

The swale drains to Mason Creek and then to Willoughby Bay. The 2012 DEQ 303d list identifies these receiving waters as impaired for PCB in fish tissue. The Chesapeake Bay TMDL addresses impairment of the entire watershed for phosphorous, nitrogen, and sediment. Proposed improvements to this BMP will provide improved pollutant removal efficiency, which will assist in meeting the Bay TMDL and local impairments.

Feasibility analysis of the BMP is complete, with design anticipated to proceed in FY16, with construction scheduled for FY17. Funds are requested to allow a more rapid construction schedule of this and other currently planned projects, and to free funding for further proposed water quality projects.

## SECTION E - POLLUTION REDUCTION

The calculated Total Pounds (Per Year) of Total Phosphorous reduced from stormwater as a result of this project

= 6.1 pounds per year

The established methodology for calculating the TP reduction is outlined in Attachment A of the SLAF Guidelines. To verify calculations for pollution reduction, the following information is required with the application:

1) Print out the Site Data tab of the Virginia Runoff Reduction Method Spreadsheet showing the data entered and resultant TP load. Supporting documentation with rationale for parameter selection must be provided to demonstrate that the parameter estimates are valid for the project.

2) Provide Text to indicate which pollution reduction calculation methodology was selected, why it is appropriate for the project, the calculated phosphorus load reduction, any assumptions with supporting documentation, and parameters selected with rationale for selection (must be provided to demonstrate that estimates are valid for the project). All supporting calculations must be provided.

3) If the project is a retrofit of an existing BMP provide photographs showing the BMP before the upgrade. Provide text to describe the upgrade / enhancement and the incremental phosphorus load reduction achieved utilizing the SLAF guideline references, with supporting documentation. Rationale and calculated estimates BMP's current (former) efficiency must be provided.



**SECTION F - READINESS-TO-PROCEED**  
**PROJECT STATUS**

	Yes	No	N/A
Is the project included in Stormwater or Watershed Management Plan? (If Yes, attach documentation to application)	✓		
Is the project identified in current year Capital Improvement Plan or Annual Budget? (If Yes, attach documentation to application)		✓	
Is acquisition of land necessary to complete project?		✓	
Has the land necessary for the project already been acquired? (If Yes, attach documentation to application)			✓
Has an engineer been selected for project design? (If Yes, provide name)	✓		

**ANTICIPATED SCHEDULE**

	<i>Schedule Item Description</i>	<i>Date</i>
a.	Notice to Proceed on Design	July 1, 2015
b.	Completion of Plans/Specifications	January 15, 2016
c.	Plans and Specs Approved	February 29, 2016
d.	Advertise for Bids	March 13, 2016
e.	Bid Opening	April 5, 2016
f.	Award Contracts	July 1, 2016
g.	Estimated Construction Time (expressed in months)	4

**SECTION G -PROJECT BUDGET INFORMATION**

Legal / Administration	\$0.00
Land, Right-of-Way	\$0.00
Architectural Engineering Basic Fees	\$46000.00
Project Inspection Fees	\$0.00
Other (Explain)	\$0.00
Stormwater BMP Construction	\$79200.00
Contingencies	\$8800.00
<b>TOTAL*</b>	<b>134,000 *</b>

\*This amount should be the exact same as the amount in Item c) Total Project Cost, Section B, Page 1.

## SECTION H

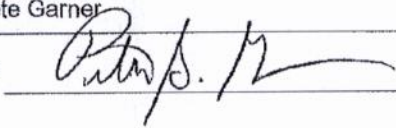
	Yes	No	N/A
Has applicant adopted a dedicated source of revenue to implement a stormwater control program in accordance with §15.2-2114? (If so, attach documentation)	✓		
Is the applicant subject to an MS4 discharge permit in accordance with §62.1-44.5?	✓		
Does the project address requirements of your MS4 permit? If yes, explain:	✓		
<p>The City of Norfolk MS4 permit calls for the City to develop, implement and refine pollution prevention measures, management or removal techniques, and other appropriate means to control the quality and quantity of storm water discharged from the MS4. The permit further calls for a program to utilize structural and source control measures to reduce pollutants from commercial and residential areas. The project described above will provide both quality and quantity improvements to water discharged through the City's MS4, meeting a requirement of the permit.</p>			

Name of MS4 Permittee if different from Applicant

## SECTION I - ASSURANCES AND CERTIFICATIONS

The undersigned representative of the applicant certifies that the information contained herein and the attached statements and exhibits are true, correct and complete to the best of their knowledge and belief. The undersigned also agrees to clarify or supplement information pertaining to this application upon request.

Name: Pete Garner Title: Operations Engineering Manager

Signature:  Date: October 21, 2014

## SECTION J - ATTACHMENTS

Include all required attachments appropriate for your application. The following is a list of potential attachments:

- 1) Documentation supporting the Pollution Reduction methodology, calculations, text, etc. as described in Section E.
- 2) Excerpt from Stormwater or Watershed Management Plan. (Section F)
- 3) Excerpt from Capital Improvement Plan or Annual Budget. (Section F)
- 4) Documentation of land acquisition. (Section F)
- 5) Documentation of Dedicated Revenue Source for Stormwater Management Program. (Section H)



## EXECUTIVE SUMMARY

The City of Norfolk, Virginia requested that Kimley-Horn and Associates, Inc. (Kimley-Horn) conduct a feasibility study to evaluate water quality improvement opportunities and potential generation of nutrient credits for Dune Street Park (the Site) in Norfolk, Virginia. The primary goal of the proposed improvements will be to reduce nutrient loading in Willoughby Bay and thus, the Chesapeake Bay and provide an opportunity for the City to obtain nutrient reduction credits. Secondary benefits will include the improvement of natural habitat through the creation and enhancement of wetlands.

The Dune Street Park is located north of the intersection of Dune Street and Meadowbrook Lane in Norfolk, Virginia. An existing swale carries stormwater through the park and flows east to west through the park. This swale is approximately 370 feet in length and has a trapezoidal cross section with a 6 foot wide flat bottom. The Dune Street Park swale currently receives water from 3.15 acres of the adjacent neighborhood located to the north and east through sheet flow (existing watershed).

The proposed retrofit will increase the drainage area for Dune Street swale to 35.3 acres by connecting the swale to the adjacent stormwater pipe network by installation of a split flow junction box. The purpose of the junction box will be to divert frequent first flush rainfall events into the swale while at the same time allowing larger stormwater flows to bypass the swale and continue through the existing drainage system. Flow from the existing and diverted drainage areas will outfall through a 36-inch pipe along the southwestern park boundary into the upstream limits of Mason Creek. Mason Creek is a tributary of the Willoughby Bay (HUC 020802080302) and the Chesapeake Bay.

After completing Site reconnaissance, document review, and hydrologic analysis, the most effective retrofit opportunity is enhancement of the Dune Street swale to a DEQ Level 2 Wet Swale. Wet Swales are linear wetland cells that filter and treat stormwater runoff. The retrofit would consist primarily of developing the channel geometry including a pretreatment forebay, installing a diversion structure (junction box) to the adjacent drainage system to divert 1" rainfall and smaller events into the swale, creating off-line wetland cells, and conversion of the swale perimeter from managed turf to forest/open space.

The water quality calculations for analysis of the proposed retrofit utilized the Virginia Runoff Reduction Method and are included as Appendix D. The total retrofit nutrient reduction accounts for both the swale enhancement and land conversion. The proposed retrofit cannot treat the full contributing drainage area due to its available size, but will reduce annual phosphorus loading by up to 6.2 pounds and annual nitrogen loading by up to 39.2 pounds. It is also estimated that 1,667 pounds of total suspended solids/sediments could be reduced per year with proper maintenance of the wet swale.

A preliminary Opinion of Probable Construction Cost (OPCC) was prepared for construction of the Dune Street Wet Swale and is included as Appendix C. The OPCC includes major aspects of the retrofit design as described above, including grading, wetland plantings, erosion and sediment control, and stormwater infrastructure modification. The total construction cost per this OPCC is approximately \$88,000. Table 4-2 summarizes the nutrient removal rates and cost efficiency of the proposed swale retrofit.

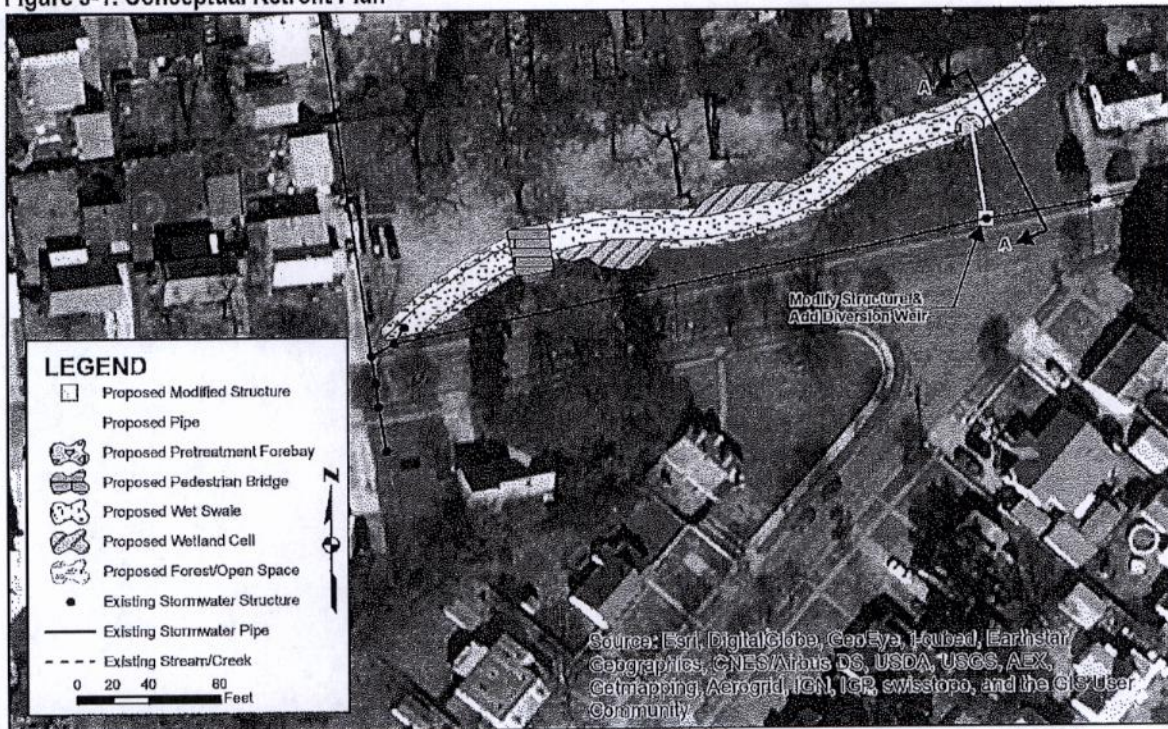
Table 4-2: Nutrient Removal Efficiency		
	Nutrient Removal	Cost Efficiency / Year
Phosphorus	6.2 lbs./yr.	\$14,200 /lbs./yr.
Nitrogen	39.2 lbs./yr.	\$2,200 /lbs./yr.
Total Suspended Solids	1,667 lbs./yr.	\$53 /lbs./yr.



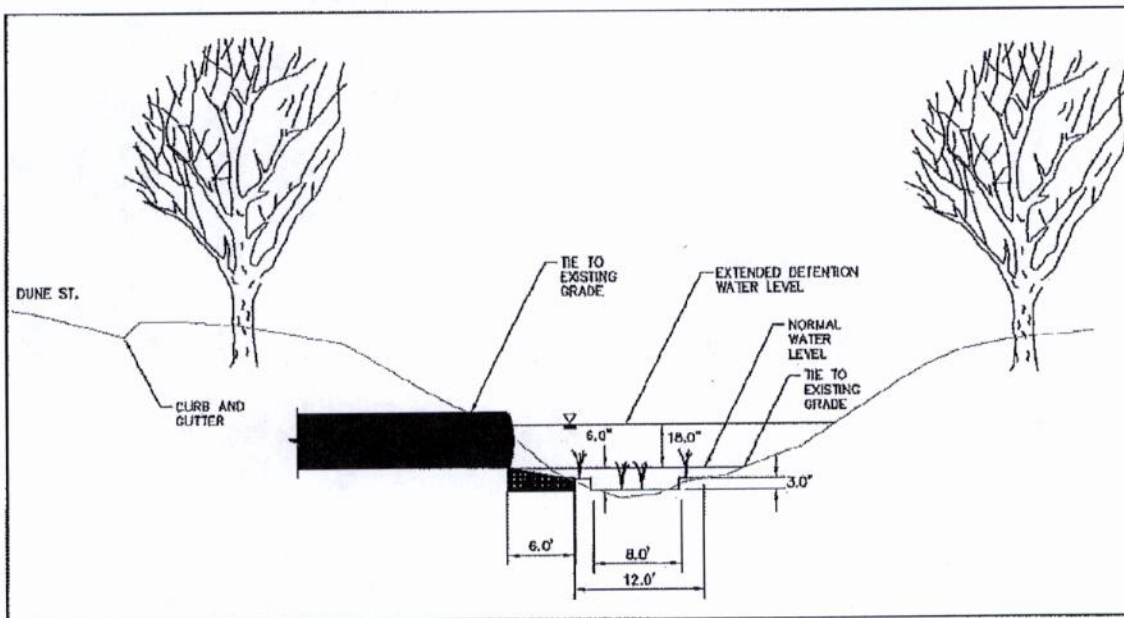
Kimley-Horn recommends that coordination with the USACE and DEQ be continued to confirm coverage of the proposed improvements under a USACE Nationwide Permit 27. The project's permit application should include a proposal for success monitoring that will meet with USACE approval. Kimley-Horn also recommends hydraulic analysis of the proposed retrofit be completed to determine the capacity of the swale and parallel stormwater pipe for the 10-year storm events. This analysis should also evaluate the outfall structure condition and performance. Additionally, Kimley-Horn recommends a full geotechnical investigation to determine the seasonally high groundwater table elevation and on site soil composition.

This retrofit has an anticipated phosphorus removal of 6.2 pounds per year, an OPCC of \$88,000, and a cost efficiency of \$14,200 per pound of phosphorus per year. This project will assist the City in meeting its target TMDL goals as well as provide improvement of natural habitat through the creation of wetlands and conserved area. Figure 3-1, below, depicts the conceptual retrofit plan. A full size conceptual plan and cross-section detail are included as Appendix A.

Figure 3-1: Conceptual Retrofit Plan







# Kimley»Horn

Project: Dune Street  
 Project #: 113057069  
 Date: 10/21/2014  
 Locality: Norfolk (City)

LAND USE TYPE	C	CN
IMPERVIOUS	0.95	98
MANAGED TURF	0.25	80
FOREST/ OPEN SPACE	0.05	77

Drainage Area Summary							
Site Name	Drainage Area	Impervious	Managed Turf	Forest/Open Space	C	CN	Tv (ac-ft)
Current DA	3.15 ac	1.08 ac	1.01 ac	1.06 ac	0.42	85.2	0.11 ac-ft
Proposed DA	35.33 ac	14.33 ac	13.60 ac	7.40 ac	0.49	86.7	1.45 ac-ft

Nutrient Removal Summary			
Improvement	Phosphorus Removal	Nitrogen Removal	TSS Removal
Pond Retrofit	6.0 lbs/yr	37.9 lbs/yr	1,313 lbs/yr
Land Conversion	0.2 lbs/yr	1.3 lbs/yr	354 lbs/yr
Net Benefit	6.2 lbs/yr	39.2 lbs/yr	1,667 lbs/yr

Post-Retrofit Water Quality Volume					
Layer	Depth (ft)	Length (ft)	Avg. Width (ft)	Storage Volume	Storage Volume
Extended Detention	1.5	400	22.5	13,500 cu-ft	0.31 ac-ft
Normal Pool	1.0	400	15.0	6,000 cu-ft	0.14 ac-ft
Wetland Cells	1.5	150	20.0	4,500 cu-ft	0.10 ac-ft
			Total	24,000 cu-ft	0.55 ac-ft



Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014

To be used w/ DRAFT 2013 BMP Standards and Specifications

Site Data

Project Name: Dune Street Swale

Date: October 2014

data input cells  
calculation cells  
constant values

Post-ReDevelopment Project & Land Cover Information

Total Disturbed Acreage

0.30

Constants

Annual Rainfall (inches)	46			
Target Rainfall Event (inches)	1.00			
Phosphorus EMC (mg/L)	0.28		Nitrogen EMC (mg/L)	1.86
Target Phosphorus Target Load (lb/acre/yr)	0.41			
P	0.90			

Pre-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	5.82	1.11	0.47	7.40
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	11.36	1.78	0.45	13.60
Impervious Cover (acres)	0.00	11.25	2.82	0.26	14.33
				Total	35.33

Post-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	5.82	1.11	0.85	7.78
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	11.36	1.78	0.08	13.22
Impervious Cover (acres)	0.00	11.25	2.82	0.26	14.33
				Total	35.33

Area Check Okay Okay Okay Okay

Rv Coefficients

	A soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

Land Cover Summary

Listed

Adjusted<sup>1</sup>

Land Cover Summary

Post-ReDevelopment

Post-ReDevelopment New Impervious

	Listed	Adjusted <sup>1</sup>			
Pre-ReDevelopment			Post-ReDevelopment		
Forest/Open Space Cover (acres)	7.40	7.40	Forest/Open Space Cover (acres)	7.78	
Composite Rv(forest)	0.03	0.03	Composite Rv(forest)	0.03	
% Forest	21%	21%	% Forest	22%	
Managed Turf Cover (acres)	13.60	13.60	Managed Turf Cover (acres)	13.22	
Composite Rv(turf)	0.20	0.20	Composite Rv(turf)	0.20	
% Managed Turf	39%	39%	% Managed Turf	37%	
Impervious Cover (acres)	14.33	14.33	ReDev. Impervious Cover (acres)	14.33	New Impervious Cover (acres) 0.00
Rv(impervious)	0.95	0.95	Rv(impervious)	0.95	Rv(impervious) 0.95
% Impervious	41%	41%	% Impervious	41%	% Impervious Check Area
Total Site Area (acres)	35.33	35.33	Total ReDev. Site Area (acres)	35.33	Total New Dev. Site Area (acres) 0.00
Site Rv	0.47	0.47	ReDev. Site Rv	0.47	New Dev. Site Rv 0.95

Pre-Development Treatment Volume (acre-ft)	1.3861	1.3861	Post-Development Treatment Volume (acre-ft)	1.3798	Post-Development Treatment Volume (acre-ft) 0.0000
Pre-Development Treatment Volume (cubic feet)	60,379	60,379	Post-Development Treatment Volume (cubic feet)	60,104	Post-Development Treatment Volume (cubic feet) 0
Pre-Development Load (TP) (lb/yr)	40.30	40.30	Post-Development Load (TP) (lb/yr)	40.12	Post-Development Load (TP) (lb/yr) 0.00

<sup>1</sup>Adjusted Land Cover Summary reflects the pre redevelopment land cover minus the previous land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requirement for the new impervious cover to meet the new development load limit is computed in Column I.

Maximum % Reduction Required Below Pre-ReDevelopment Load

10%

TP Load Reduction Required for Redeveloped Area (lb/yr)

3.85

TP Load Reduction Required for New Impervious Area (lb/yr)

0.00

Total Load Reduction Required (lb/yr)

3.85

Pre-Development Load (TN) (lb/yr)

288.30

Post-Development Load (TN) (lb/yr)

288.99



<b>Site Results</b>					
	<b>D.A. A</b>	<b>D.A. B</b>	<b>D.A. C</b>	<b>D.A. D</b>	<b>D.A. E</b>
IMPERVIOUS COVER	14.33	0.00	0.00	0.00	0.00
IMPERVIOUS COVER TREATED	14.33	0.00	0.00	0.00	0.00
TURF AREA	13.22	1.00	0.00	0.00	0.00
TURF AREA TREATED	13.22	1.00	0.00	0.00	0.00
AREA CHECK	OK.	OK.	OK.	OK.	OK.
<b>Phosphorous</b>					
TOTAL PHOSPHOROUS LOAD REDUCTION REQUIRED (LB/YEAR)	3.85				
RUNOFF REDUCTION (cf)	73				
PHOSPHOROUS LOAD REDUCTION ACHIEVED (LB/YR)	15.89				
ADJUSTED POST-DEVELOPMENT PHOSPHOROUS LOAD (TP) (lb/yr)	24.23				
REMAINING PHOSPHOROUS LOAD REDUCTION (LB/YR) NEEDED	CONGRATULATIONS!! YOU EXCEEDED THE TARGET REDUCTION BY 12 LB/YEAR!!				
<b>Nitrogen (for information purposes)</b>					
RUNOFF REDUCTION (cf)	73				
NITROGEN LOAD REDUCTION ACHIEVED (LB/YR)	99.74				
ADJUSTED POST-DEVELOPMENT NITROGEN LOAD (TP) (lb/yr)	187.25				



**City of Norfolk Storm water  
Capital Improvement Project Budget Excerpt**

## Attachment 8

PUBLIC WORKS OPERATIONS FIELD ENGINEERING  
Water Quality CIP

NOTES	PROJECTS	PROJECT COSTS	BUDGET AMOUNT
	<b>Storm Water Quality Improvement FY15</b>		<b>\$950,000</b>
	Ballentine Elementary School BMP Retrofit	\$200,000	
	Norfolk Juvenile Detention Center BMP Retrofit	\$130,000	
	Parkdale Ditch Construction	\$300,000	
	Oyster Restoration	\$50,000	
	Blue Bird Park Ditch/Drainage Retrofit	\$145,000	
	Mason Creek	\$125,000	
	** Templar Boulevard Stream Retrofit Design	\$50,000	
	** Roberts Road BMP Retrofit Design	\$64,000	
	** Lake Taylor Reservoir BMP Conversion Design	<u>\$298,000</u>	
	** Pending 2013 SLAF Reimbursement	<u>\$1,362,000</u>	
	<b>Storm Water Quality Improvement FY16</b>		<b>\$950,000</b>
	Templar Boulevard Stream Construction	\$92,000	
	Central Business Park BMP Retrofit Design	\$57,000	
	Lake Taylor Reservoir BMP Conversion Phase 1 Construction	\$688,000	
	Dune Street Swale Retrofit Design	\$46,000	
	Oyster Restoration	\$100,000	
	Pond Buffers	<u>\$94,441</u>	
	Note: FY16 includes remaining 2013 SLAF reimbursement (\$127,441)	<u>\$1,077,441</u>	
	<b>Storm Water Quality Improvement FY17</b>		<b>\$950,000</b>
	Roberts Road BMP Retrofit Construction	\$209,000	
	Central Business Park BMP Retrofit Construction	\$107,000	
	Dune Street Swale Retrofit Construction	\$88,000	
	Oyster Restoration	\$150,000	
	Hague Retention Pond Design	\$200,000	
	Pond Buffers	<u>\$146,000</u>	
		<u>\$900,000</u>	
	<b>Storm Water Quality Improvement FY18</b>		<b>\$950,000</b>
	Hague Retention Pond Construction	\$550,000	
	Lake Taylor Reservoir BMP Conversion Phase 2 Construction	\$343,000	
	Pond Buffers	<u>\$57,000</u>	
		<u>\$950,000</u>	
	<b>Storm Water Quality Improvement FY19</b>		<b>\$950,000</b>
	Lake Taylor Reservoir BMP Conversion Phase 3 Construction	\$358,000	
	Anne Outten Pond Retrofit Design	\$75,000	
	Norview High School BMP Retrofit Design	\$75,000	
	Oyster Restoration	\$125,000	
	Citywide Pre Engineered Water Quality Retrofits	\$192,000	
	Pond Buffers	<u>\$125,000</u>	
		<u>\$950,000</u>	



**City of Norfolk Municipal Code Excerpt Identifying  
Storm water Special Revenue**

Norfolk, Virginia, Code of Ordinances >> - CODE OF THE CITY >> Chapter 41.1 - STORMWATER MANAGEMENT >> ARTICLE I. IN GENERAL >>

---

ARTICLE I. IN GENERAL

---

Sec. 41.1-1. Definitions.

Sec. 41.1-2. Violations of chapter.

Sec. 41.1-3. General responsibilities of director.

Sec. 41.1-4. Pollution of the stormwater system.

Sec. 41.1-5. Failure to install or maintain stormwater best management practice.

Sec. 41.1-6. Swimming or entering stormwater retention ponds, storm sewers or storm drains.

Secs. 41.1-7—41.1-20. Reserved.

**Sec. 41.1-1. Definitions.**

For purposes of this chapter, certain words and phrases shall have the meaning ascribed to them by this section:

*Billing period:* The term or length of time during which the stormwater management fee accrues and for which such fee is fixed and collected.

*Council:* The council of the City of Norfolk, Virginia.

*Department:* The department of public works.

*Developed property:* Any parcel which contains impervious surface area.

*Director:* The director of the department of public works or his designee.

*Exempt property:* Any parcel which is owned by any federal, state or local agencies on which said agency provides for maintenance of storm drainage and stormwater control facilities that drain directly into United States waters.

*Impervious surface area:* Surfaces on or in a lot or parcel of property which substantially reduce the rate of infiltration of stormwater into the earth.

*Nonresidential property:* All developed properties not meeting the residential property definition, including, but not limited to, commercial properties, industrial properties, parking- lots, recreational and cultural facilities, hotels, offices, churches, condominium associations, and multifamily facilities of five (5) units or more.

*Person:* Any individual, corporation, partnership, association, company, business, trust, joint venture, or other legal entity.

*Residential property:* Developed property containing at least one but no more than four (4) residences or dwelling units and accessory uses related to but subordinate to the purpose of providing a permanent dwelling facility. Such property shall include, but not be limited to, houses, duplexes, triplexes, quadplexes, townhouses, and mobile homes.



*Storm sewer or storm drain:* A sewer which carries stormwaters, surface runoff, street wash waters, and drainage, but which does not carry sanitary sewage.

*Stormwater management code:* Chapter 41.1 of the code of the City of Norfolk, Virginia.

*Stormwater runoff:* That part of precipitation that travels over natural, altered, or impervious surfaces to the nearest stream, channel, conduit or impoundment and appears in surface waters.

*Stormwater system:* All facilities, structures, and natural watercourses used for collecting and conveying stormwater to, through, and from drainage areas to the points of final outlet including, but not limited to, the following: streets, curbs and gutters, inlets, conduits and appurtenant features, canals, creeks, channels, catch basins, ditches, drains, sewers, streams, gulches, gullies, flumes, culverts, siphons, retention or detention basins, dams, floodwalls, levees, pumping stations, and wetlands.

*Undeveloped property:* Any parcel which has not been altered from its natural state to disturb or alter the topography or soils on the property in a manner which substantially reduces the rate of infiltration of stormwater into the earth.

(Ord. No. 38,344, § 1, 5-14-96)

#### **Sec. 41.1-2. Violations of chapter.**

Any person who violates any provision of this chapter or any regulation promulgated pursuant to authority granted in this chapter shall be guilty of a class 1 misdemeanor. Each day of violation shall constitute a separate offense. In addition to any penalty imposed for each violation, a judge hearing the case may direct the person responsible for the violation or the property owner to correct the violation and each days default in such correction shall constitute a violation of and a separate offense under this section.

(Ord. No. 38,344, § 1, 5-14-96)

#### **Sec. 41.1-3. General responsibilities of director.**

The director of public works shall be responsible for the use, management, operation and maintenance of the stormwater system as prescribed by this chapter. He shall have authority to establish procedures and to enforce regulations pertaining to the stormwater system.

(Ord. No. 38,344, § 1, 5-14-96)

#### **Sec. 41.1-4. Pollution of the stormwater system.**

- (a) It shall be unlawful for any person to put, throw, place or deposit, or allow to be put, thrown, placed or deposited, any filth, animal or vegetable matter, chips, compost, construction debris, shavings, or any other substance or pollutant whether solid or liquid in the stormwater system or place or dispose of such material or substance in an area which drains into the stormwater system.
- (b) It shall be unlawful for any person to pour or discharge, or to permit to be poured or discharged, or to deposit, so that the same may be discharged, any gasoline, oil waste, antifreeze, or other automotive, motor or equipment fluids into the stormwater system.
- (c) It shall be unlawful for any commercial, industrial, or manufacturing entity to discharge process water, wash water, or unpermitted discharge into the stormwater system.

- (d) It shall be unlawful for any person to throw, place or deposit, or cause to be thrown, placed or deposited, in any gutter, ditch, storm drain or other drainage area in the city, anything that impedes or interferes with the free flow of stormwater therein.
- (e) It shall be unlawful for any person to discharge chlorinated swimming pool water into the stormwater system.

(Ord. No. 38,344, § 1, 5-14-96)

**Sec. 41.1-5. Failure to install or maintain stormwater best management practice.**

It shall be unlawful to neglect or fail to install or maintain a stormwater best management practice as shown on an approved site plan where the stormwater best management practice has been reviewed and approved by the stormwater management division of the department of public works.

(Ord. No. 38,344, § 1, 5-14-96)

**Sec. 41.1-6. Swimming or entering stormwater retention ponds, storm sewers or storm drains.**

It shall be unlawful for any person to enter or swim in any stormwater retention pond, storm sewer or storm drain. This section shall not apply to city personnel in the performance of their duties.

(Ord. No. 40,696, § 1, 5-14-02)

**Secs. 41.1-7—41.1-20. Reserved.**



Norfolk, Virginia, Code of Ordinances >> - CODE OF THE CITY >> Chapter 41.1 - STORMWATER MANAGEMENT >> ARTICLE II. STORMWATER MANAGEMENT FEES >>

---

ARTICLE II. STORMWATER MANAGEMENT FEES

---

Sec. 41.1-21. Findings, intent and authority.

Sec. 41.1-22. Classification of properties.

Sec. 41.1-23. Stormwater management fees.

Sec. 41.1-24. Stormwater utility fund.

**Sec. 41.1-21. Findings, intent and authority.**

- (a) The Federal Clean Water Act requires the city to implement a stormwater management program based on regulations and requirements published by the United States Environmental Protection Agency.
- (b) The city is authorized by the State Code of Virginia to construct, reconstruct, improve and extend a stormwater utility system and to issue revenue bonds, if needed, to finance in whole or in part the cost of such system and to establish just and equitable rates, fees and charges for the services and facilities provided by the system.
- (c) It is necessary and essential that the city provide for effective management and financing of a stormwater system within the city, to provide a mechanism for mitigating the damaging effects of stormwater runoff on our environment, to improve the public health, safety and welfare by providing for the safe and efficient capture and conveyance of stormwater runoff, improvement of water quality and the correction of stormwater problems.
- (d) Stormwater runoff is associated with all developed properties in the city, whether residential or nonresidential and the volume of each individual property's stormwater runoff is determined by the amount of impervious surface on the property.

(Ord. No. 38,344, § 1, 5-14-96)

**Sec. 41.1-22. Classification of properties.**

- (a) For the purpose of determining the stormwater management fee, all properties in the city shall be classified by the director into one of the following categories:
  - (1) Residential.
  - (2) Nonresidential.
  - (3) Undeveloped.
  - (4) Exempt.
- (b) The director shall determine impervious area for nonresidential property accounts considering data supplied by the real estate assessor, other city staff and/or the property owner's certified land surveyor or professional engineer. The director may require additional information from the owner as necessary to make such a determination. The assessed stormwater management fee shall be updated by the director based on any change in impervious area.
- (c)

The stormwater management fee for vacant developed property, both residential and nonresidential, shall be the same as that for occupied property of the same class.

- (d) Undeveloped property shall be exempt from the stormwater management fee.

(Ord. No. 38,344, § 1, 5-14-96)

#### **Sec. 41.1-23. Stormwater management fees.**

- (a) The following stormwater management fees are hereby authorized:

Type of Account	Daily Rate	Effective Date
Residential Accounts	\$0.323	July 1, 2012
Nonresidential Accounts	\$0.233 per 2,000 square foot of impervious area	July 1, 2012

For residential accounts that are active as of July 1, 2012, the rate will be adjusted on July 1, 2012, so that the rate will be \$0.323 per day. For nonresidential accounts, the rate will increase on July 1, 2012 to \$0.233 per day per two thousand (2,000) square feet of impervious surface. Rates will be calculated by rounding to the nearest two thousand (2,000) square feet of impervious area with a minimum bill based on two thousand (2,000) square feet.

- (b) All charges for this service shall be assessed to the property owner or occupant. If the occupant is a tenant and the party to whom the water and sewer service is billed, the charges may be assessed to the tenant. Assessed charges, or stormwater management fees, shall be paid periodically in accordance with promulgated regulations.
- (c) When new properties are brought into the utility system, fees will accrue commencing with either the issuance of a valid building permit or upon completion of any construction which contributes impervious surface area where no certificate is issued or required for such construction.
- (d) In the event of alteration or addition to a nonresidential property which alters the amount of impervious surface area, the stormwater management fees will be adjusted upon either the release of the final building inspection or upon completion of the construction, whichever occurs first, and the adjustment will be reflected in the next billing cycle prorated on a daily basis.
- (e) Petitions for adjustments of the stormwater fees for residential and nonresidential properties shall be submitted to the director of public works, who shall be given authority to administer the procedures and standards and review criteria for the adjustment of fees as established herein.

(Ord. No. 38,344, § 1, 5-14-96; Ord. No. 38,403, § 1, 5-28-96; Ord. No. 42,277, § 10, 5-16-06; Ord. No. 42,662, § 21, 5-15-07; Ord. No. 44,695, § 10, 5-22-12)

#### **Sec. 41.1-24. Stormwater utility fund.**

There shall be established a stormwater utility fund for the deposit of all fees collected pursuant to this article. The fund will be used exclusively to provide services and facilities related to the stormwater management system. The deposited monies shall be used for the following expenditures:



- (1) Operation, maintenance, and repair of the stormwater system;
- (2) Costs for the evaluation, design, construction management, and construction of major and minor structural replacements, improvements, and extensions of the stormwater system;
- (3) Administrative and overhead costs related to the management of the stormwater system;
- (4) Management services such as permit review and planning and development review related to the stormwater system;
- (5) Debt service financing of capital projects related to the stormwater system; and
- (6) Establishment of reasonable operating and capital reserves to meet unanticipated or emergency requirements of the utility system.

(Ord. No. 38,344, § 1, 5-14-96)

## **Attachment 10: Feasibility and Planning Studies**

Documents available at the following link:

<S:\PWORKS\0600 - CombOps\Environmental\SLAF 2014 Supporting Documentation>



DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
APPLICATION FOR STORMWATER LOCAL ASSISTANCE FUND (SLAF)  
STORMWATER CAPITAL PROJECTS

## SECTION A - ORGANIZATIONAL DATA

Name of Applicant:

Applicant Address:

Contact Person:

Phone:  Email:

Name of Engineer:

Engineer Address:

Contact Person:

Phone:  Email:

## SECTION B - PROPOSED FUNDING

### PROJECT FUNDING

a) Amount of SLAF Grant Funds Requested

	Source of Match Funds	Amount	CHECK BOX IF COMMITTED
1	Storm Water CIP	1,548,476	<input checked="" type="checkbox"/>
2			
3			

b) Total Other Funding Available (1 + 2 + 3 ...)\*\*

c) Total Project Cost (a + b)

\*SLAF Grants provide up to 50% of project costs. Applicant must identify anticipated source(s) and amount(s) of match funds.

\*\*This amount must be at least equal to the amount of Grant Funds being requested

## SECTION C - WATER QUALITY DATA

Location of Project Latitude  Longitude

(Latitude and Longitude of project is a required entry on this application. The points should be the nearest approximation of the center of your project. Please identify them in decimal degrees.)

Name of Stream / Waterbody impacted by stormwater runoff being addressed by the project

River Basin for Receiving Stream / Waterbody

## SECTION D -BRIEF PROJECT DESCRIPTION AND STATEMENT OF NEED

Please include a description of project including: type of project (e.g. extended detention pond retrofit), size of area treated (acres), TMDL or impaired water the project addresses, if the project is relevant to a TMDL Implementation Plan, and other relevant information pertaining to the project. Describe the need for the proposed project. Needs should be in areas of restoring, protecting or preventing pollution in State waters. (attach additional pages if necessary)

In an effort to plan for the requirements of the Chesapeake Bay TMDL and other water quality needs, the City of Norfolk developed a series of BMP-specific stormwater studies starting in 2011. The goal of these studies was to identify retrofits to existing City-owned BMPs and opportunities for construction of new BMPs and restoration activities on City properties. The projects summarized below were identified as high priorities in those studies when assessed for their potential to improve water quality and to address other concerns such as flooding and improved use of green space. This application combines pollutant removal and budget information for all projects submitted for consideration. Separate applications for each individual project with detailed budget, schedule information, and supporting documentation are included as attachments 1-7. Attachment 8 relates to all applications and includes excerpts from our Capital Improvement Project budget, highlighting funds for the proposed projects. Attachment 9 relates to all applications and includes excerpts from the City of Norfolk Code identifying the storm water special revenue fund which is used to plan, design, construct, inspect and maintain projects such as those proposed. Attachment 10 relates to all applications and includes various planning and feasibility studies.

### Proposed Projects:

- 1) Lake Taylor Retention Pond Retrofit- 267.1 lbs P/yr
- 2) Roberts Rd Retention Pond Retrofit- 31.7 lbs P/yr
- 3) Hague Retention Pond Construction- 17.8 lbs P/yr
- 4) Templar Blvd Stream Restoration- 13.5 lbs P/yr
- 5) Central Business Park Retention Pond Retrofit- 12.7 lbs P/yr
- 6) Bluebird Park Stormwater Wetland Construction- 7.94 lbs P/yr
- 7) Dune St Wet Swale Retrofit- 6.1 lbs P/yr

## SECTION E - POLLUTION REDUCTION

The calculated Total Pounds (Per Year) of Total Phosphorous reduced from stormwater as a result of this project

= 356.84 pounds per year

The established methodology for calculating the TP reduction is outlined in Attachment A of the SLAF Guidelines. To verify calculations for pollution reduction, the following information is required with the application:

- 1) Print out the Site Data tab of the Virginia Runoff Reduction Method Spreadsheet showing the data entered and resultant TP load. Supporting documentation with rationale for parameter selection must be provided to demonstrate that the parameter estimates are valid for the project.
- 2) Provide Text to indicate which pollution reduction calculation methodology was selected, why it is appropriate for the project, the calculated phosphorus load reduction, any assumptions with supporting documentation, and parameters selected with rationale for selection (must be provided to demonstrate that estimates are valid for the project). All supporting calculations must be provided.
- 3) If the project is a retrofit of an existing BMP provide photographs showing the BMP before the upgrade. Provide text to describe the upgrade / enhancement and the incremental phosphorus load reduction achieved utilizing the SLAF guideline references, with supporting documentation. Rationale and calculated estimates BMP's current (former) efficiency must be provided.



**SECTION F - READINESS-TO-PROCEED**  
**PROJECT STATUS**

	Yes	No	N/A
Is the project included in Stormwater or Watershed Management Plan? (If Yes, attach documentation to application)	✓		
Is the project identified in current year Capital Improvement Plan or Annual Budget? (If Yes, attach documentation to application)	✓		
Is acquisition of land necessary to complete project?		✓	
Has the land necessary for the project already been acquired? (If Yes, attach documentation to application)			✓
Has an engineer been selected for project design? (If Yes, provide name)	✓		

**ANTICIPATED SCHEDULE**

	<i>Schedule Item Description</i>	<i>Date</i>
a.	Notice to Proceed on Design	see individual applications
b.	Completion of Plans/Specifications	
c.	Plans and Specs Approved	
d.	Advertise for Bids	
e.	Bid Opening	
f.	Award Contracts	
g.	Estimated Construction Time (expressed in months)	

**SECTION G -PROJECT BUDGET INFORMATION**

Legal / Administration	
Land, Right-of-Way	
Architectural Engineering Basic Fees	
Project Inspection Fees	
Other (Explain)	
Stormwater BMP Construction	
Contingencies	
TOTAL*	

\*This amount should be the exact same as the amount in Item c) Total Project Cost, Section B, Page 1.

## SECTION H

	Yes	No	N/A
Has applicant adopted a dedicated source of revenue to implement a stormwater control program in accordance with §15.2-2114? (If so, attach documentation)	✓		
Is the applicant subject to an MS4 discharge permit in accordance with §62.1-44.5?	✓		
Does the project address requirements of your MS4 permit? If yes, explain:	✓	-	
The City of Norfolk MS4 permit calls for the City to develop, implement and refine pollution prevention measures, management or removal techniques, and other appropriate means to control the quality and quantity of storm water discharged from the MS4. The permit further calls for a program to utilize structural and source control measures to reduce pollutants from commercial and residential areas. The project described above will provide both quality and quantity improvements to water discharged through the City's MS4, meeting a requirement of the permit.			

Name of MS4 Permittee if different from Applicant

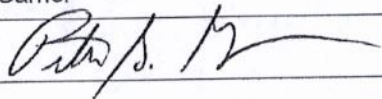
## SECTION I - ASSURANCES AND CERTIFICATIONS

The undersigned representative of the applicant certifies that the information contained herein and the attached statements and exhibits are true, correct and complete to the best of their knowledge and belief. The undersigned also agrees to clarify or supplement information pertaining to this application upon request.

Name: Pete Garner

Title: Operations Engineering Manager

Signature:



Date: October 21, 2014

## SECTION J - ATTACHMENTS

Include all required attachments appropriate for your application. The following is a list of potential attachments:

- 1) Documentation supporting the Pollution Reduction methodology, calculations, text, etc. as described in Section E.
- 2) Excerpt from Stormwater or Watershed Management Plan. (Section F)
- 3) Excerpt from Capital Improvement Plan or Annual Budget. (Section F)
- 4) Documentation of land acquisition. (Section F)
- 5) Documentation of Dedicated Revenue Source for Stormwater Management Program. (Section H)